

THE ILLUMINATING ENGINEER

LIGHT
LAMPS
FITTINGS
AND
ILLUMINATION

THE JOURNAL OF GOOD LIGHTING

Official Organ of the Illuminating Engineering Society

FOUNDED IN LONDON 1908

Edited by
J. STEWART DOW

OIL
GAS
ELECTRICITY
ACETYLENE
PETROL-AIR
GAS
ETC.

Vol. XXIII

June, 1930

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Luminous Traffic Signals—The Essentials of Sales Management—Public Lighting Tests at Lewisham—Industrial Floodlighting—The Use of Acetylene Lighting in Tunnels—A Novel Kinema Lighting Installation—News from Abroad, etc.

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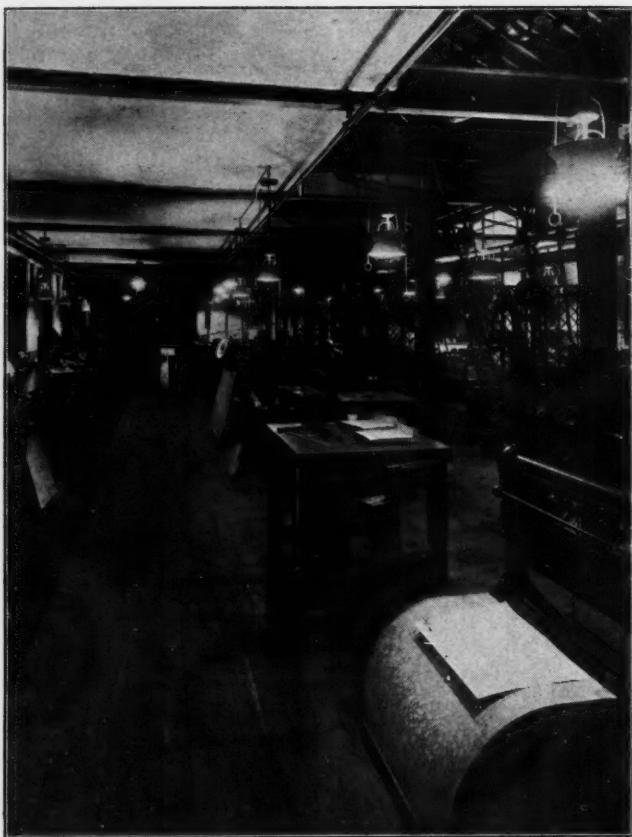
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EDITORIAL AND PUBLISHING OFFICES:
32 VICTORIA STREET, LONDON, S.W. 1.
Tel. No.: Victoria 5215

Luminous Traffic Signals

THE paper read by Mr. T. Austin before the Illuminating Engineering Society on May 6th covered a wide ground. It is true that Mr. Austin ruled out of his survey the use of light in navigating the seas (as exemplified by lighthouses and harbour signals), and the application of light to the navigation of the air (as exemplified by aerial beacons, etc.). But he was able to show that the use of light signals on railways and roads alone is a big subject.

The general use of light signals on surface railways is a comparatively recent innovation. On underground railways naturally some form of light signal had to be used from the start, and this no doubt influenced overground practice. Improvements in glass moulding, the production of better coloured glass, and progress in the manufacture of concentrated filament electric lamps have all helped to make the light-signal a practical proposition. The visibility of the semaphore signal, with its oil lamps of comparatively low candle-power, has always been somewhat restricted. During rainy and misty periods, such as are frequent in this country, it may not be light enough to see the semaphore and post and yet not really dark enough to enable the light to be discerned at any considerable distance. In addition the fact of giving the driver a different signal by night from that furnished by day is obviously a drawback.

The modern light signal eliminates these difficulties. It has a range of visibility of upwards of 4,000 ft. in the brightest sunshine and, of course, shows up still better in darkness or twilight. Further, there is only one type of coloured signal which the driver has to observe, both by night and by day. Mr. Austin discusses the design of such signals which can be adapted in various special combinations. Other useful developments are the luminous route indicator, designed to give the driver an indication as to which of a number of platform lines he is to select, and the methods of repeating to the signalmen indications given to the engine driver. Before passing on to street-traffic signals the author also referred briefly to an intermediate problem—the use of luminous signals at level crossings, usually of the flashing type. Serious accidents occasionally occurred at level crossings, and in these days of

dense motor traffic the problem is obviously an important one. It would be desirable that the flashing signal should be of a distinctive type, indicating the presence of a level crossing and different from the familiar types adopted at important intersections of roads.

Street traffic signals, either automatic or semi-automatic in action, have been adopted with considerable success in many towns of the United States and Canada, and also in Germany, South Africa and other countries. In this country the method has been less widely adopted, though we understand that there are now 40 or 50 cities which are experimenting with it. The question has been raised whether in this country, where the liberty of the individual is an institution, the public can be induced to obey such signals. We confess we entertain little doubt on this subject. Our people, if conscious of the right of private judgment, are probably the most law-abiding and the most ready to accept any step in the common interest of any in the world. Another objection, which has more weight, is that most of our cities are planned on lines very different from those in the United States. We have to deal not only with broad straight thoroughfares intersecting at right angles, but with narrow and tortuous thoroughfares. This fact, however, does not imply that automatic signalling would have no value, but rather that it would require modification according to local conditions—modification which is by no means inconsistent with the application of the now familiar “three-colour” signals. The advantages of luminous signals surely outweigh any difficulties in their immediate application. We believe that in time to come people will wonder at the long continuance of a system which converts the most efficient police officers into semaphore machines. With the wider use of luminous traffic signals they would be relieved of the fatigue of continual arm movements, but, as traffic supervisors, their skill would still be at the service of the public.

Mr. Austin deals very ably with the design of such systems. There is only one aspect on which something further might be said. We allude to the unsightly effect of some of the signalling apparatus at present being installed. It is perhaps idle to lament that our roads are coming more and more to resemble railways, but at least the signalling devices might be housed in structures that give some impression of permanence and appear less mechanical to the eye.

The Essentials of Sales Management

MR. F. W. GOODENOUGH, C.B.E., in his recent address to the Incorporated Sales Managers' Association at Scarborough, chose as his subject "The Essentials of Sales Management." The major part of the address was devoted to the enunciation of a series of fundamental principles which apply to all forms of salesmanship, but are, we think, particularly applicable to the efforts of those who have to sell gas or electricity, lamps or lighting appliances to the public.

The first and fundamental principle is the obvious but often forgotten one—that every business exists for the service of the community in general and of the individual customer in particular; and that business relations can only be permanently profitable to the seller if they are also profitable to the buyer. That principle is embodied in the motto "Service First," which progressive supply undertakings have adopted. In developing this idea Mr. Goodenough stated that he had found it useful to remind his staff that the directors have no money to pay their salaries or their co-partnership bonuses and dividends, or wherewith to pay fees to themselves or dividends to the other shareholders, except that which the customers pay to the cashiers of the company. In other words, "the customers are, in the long run, their employers."

From this first principle others follow. Business can only be permanently successful if efforts are persistently made to secure the satisfaction and confidence of the consumer. The mind, habits and needs of the customer must be sympathetically studied. The seller must have an imaginative and informed understanding of the market—a principle of special importance in relation to overseas trade. He must not be content merely to seek markets for the goods that are already being produced; he must of necessity design other goods and services to meet the needs of customers. "His word should be as good as his bond, and his performance better, if possible, than either." If unforeseen circumstances prevent the punctual performance of a promise, timely and courteous explanation should be made. The customer should not be left to discover the default. "Complaint forestalled means fault forgiven." Every complaint, whether justified or not, should be made an opportunity to make a satisfied friend of the consumer, who rarely complains unless he believes himself to have just cause. Mr. Goodenough completed this section of his address by remarking that all these precepts are contained in the Golden Rule of Conduct, "Do unto others what ye would that others should do unto you—and do it with zeal and enthusiasm born of the desire to serve."

In the final section of the address Mr. Goodenough enumerated the qualifications of a good sales manager. First and foremost amongst these are knowledge of human nature and the capacity for making friends. We do not think it is possible to overestimate this last qualification, which anyone in every walk of life should endeavour to acquire. How often does one find a man of genuine technical ability allied to a considerable degree of astuteness, who fails or only achieves a partial success because he makes insufficient allowance for the feelings of others and has not the knack of establishing their goodwill. Such a man attributes his misfortunes to the perverseness of other people. He does not realize that the friendliness of others, without which our own efforts can do little, must be worked for and deserved.

In emphasizing these aspects of salesmanship we might perhaps be held to be quoting platitudes; yet it is often just these simple obvious principles that are liable to be imperfectly followed in practice. They are of moment to everyone. We are all in a sense salesmen, disposing either of things we manufacture, the commodities we control, or our own knowledge and skill. In the lighting industry we hold that they are of paramount importance, for here one has to study human nature to a peculiar degree. There are some fields where the judgment of the layman can of necessity have little weight, where he must bow to the knowledge of the expert. Not so with lighting. The production of efficient lamps and lighting appliances rests almost entirely with the expert, and his views as to their application should not be lightly set aside by the consumer. Yet the satisfaction of the needs of the public is the ultimate test of good service, here as elsewhere. A deep knowledge of the applications of artificial light is only to be acquired by sympathetic study, not only of the needs but even of the whims and fancies of the consumer.

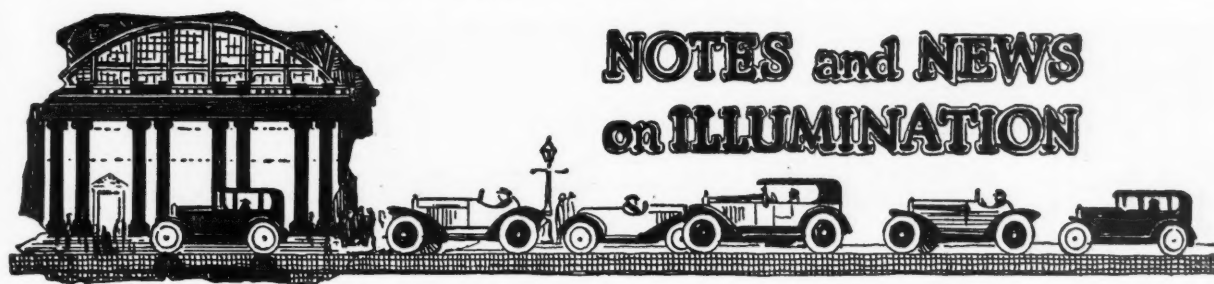
Public Lighting Tests at Lewisham

CENTRALLY SUSPENDED GAS LAMPS ADOPTED

FOLLOWING the tests of street lighting conducted on the London-Hastings Road by the Lewisham Borough Council, to which allusion was made in our last issue, the Council has now decided to adopt the overhead central lighting provided by the gas company. The committee, in reporting in favour of the gas lighting, express the opinion that this overhead central-lighting system "gives the more satisfactory result, and is one that more fully meets the traffic requirements." This expression of opinion seems to be in line with the published views of various motoring and traffic experts who inspected the installations. It would seem that, in this case at any rate, the adoption of central suspension system was largely responsible for the decision in favour of gas lighting.

The report of the Works and Highways Committee accepted by the Council contained the recommendation that central gas lighting should be adopted for all main roads in the borough over 50 ft. in width, with the exception of the portion of the Hastings Road between Loampit Vale and the borough boundary next Deptford; the installation of several central electric lights in Loampit Hill is also recommended.

Thus ends the discussion on this street-lighting problem, which has attracted so much public interest. As we have previously remarked, the equipment of trial installations, the carrying-out of tests and the effort made to secure the views of motorists and others set an important precedent. We hope that other public authorities will be encouraged to make systematic investigations before deciding on methods of public lighting. The incident has been instructive in showing how greatly the manner in which a lighting installation is arranged may influence the decision in favour of one or another illuminant. In this case the central-suspension system was evidently preferred, but it does not follow that this method should invariably be adopted. There are other factors which those concerned with public lighting installations would do well to bear in mind, such as elimination of glare. We believe that this consideration will play a much more important part in influencing public authorities in their choice of method in the future.



NOTES and NEWS on ILLUMINATION

The International Illumination Congress (1931)

Further particulars of the arrangements in connection with the International Illumination Congress of 1931 are now to hand. The meeting will be divided into two parts. The First Week will consist of a tour. Visitors will be received in London on September 2nd, and they will subsequently visit Glasgow (September 4th), Edinburgh (September 6th), Sheffield (September 9th), and Birmingham (September 11), where technical sessions will be held, the intervening days being occupied in travelling and visiting places of interest. The Second Week, from Sunday, September 13th to Saturday, September 19th, will be spent in Cambridge, where arrangements have been made for the accommodation of the delegates and the holding of the various technical committees and for the plenary assembly of the International Commission on Illumination. Local committees have been formed in Glasgow, Edinburgh, Sheffield and Birmingham—all cities which the Congress has been officially requested by the respective City Corporations to visit. The following are among the subjects which it is anticipated will receive attention: Factory lighting, office lighting, home lighting, lighting for aviation, lighthouses and buoys, vehicle lighting, street lighting, traffic-control lighting, floodlighting, architectural lighting, daylight, museum lighting, lighting bureaux, laboratory technique, mine lighting, etc. Papers and discussions will also be illustrated by visits to local factories, shipyards, aerodromes, etc. Arrangements for this important congress are thus taking shape. Those interested are reminded that the Hon. General Secretary is Col. C. H. S. Evans (c/o the Illuminating Engineering Society, 32, Victoria Street, London, S.W.1).

Street Lighting and Safety

A feature of the National Safety Congress, held in Liverpool during May 20th to 22nd, was the delivery of an address by Sir Henry P. Maybury on "The Development of Roads and Road Transport, with special reference to the Prevention of Accidents." A contribution of even more direct interest to readers was the paper read by Mr. Robert Beveridge (Inspector of Lighting and Cleansing, City of Edinburgh), on "Street Lighting and Illuminated Traffic Signals in relation to Prevention of Accidents." There is room for much research in this field, and there is an evident need for authoritative and effective data illustrating the close relation between good lighting and safety. The congress was opened on the morning of the 21st by H.R.H. the Duke of York (President of the Association). In view of the progressive and regrettable increase in fatalities in streets, it cannot have failed to attract public notice. An excellent opportunity of presenting the claims of better public lighting was presented.

Sheffield Illumination Society

A party of members and friends of the Sheffield Illumination Society paid a visit to the Vickers' works of the English Steel Corporation Ltd. on the 7th May. The party was conducted under expert guidance over these huge works, and the various processes in the treatment of steel were fully explained. Mr. G. Sayer (President of the Society) expressed the thanks of the members for this interesting and instructive visit.

Street Accidents in 1929

The usual record of "Street Accidents Caused by Vehicles and Horses" has been issued by the Home Office for the past year. Comments in the press will have prepared the public for the fact that the total number of persons killed or injured again shows an increase. In England and Wales the total number of persons killed or injured was 162,109 (as compared with 156,119 in 1928) and the number killed was 5,990 (as compared with 5,489 in 1928). The corresponding figures for Scotland, 15,504 and 706, also show an increase. In the Metropolitan Police District alone 1,362 people were killed and 56,865 injured. These statistics are arranged with a view to showing the numbers of accidents caused by each type of vehicle. As might be expected private cars, being so much more numerous, were responsible for more accidents than other types of vehicles, being responsible for rather less than one-third of the total number. In these records no distinction is drawn between accidents occurring respectively by night and by day. A study of accidents classified on this basis (which could doubtless be compiled from the data available) would yield much interesting information, and would, we believe, serve to show that inadequate public lighting is a contributory factor of considerable importance.

Street Lighting Tests in Bradford

In our last issue we commented upon the street lighting experiments being conducted by the South Metropolitan Gas Co. and the South London Electric Supply Co. on the Hastings Road. We understand that the installations have been the subject of tests by Prof. A. M. Low, who comments on the more even distribution of light resulting from the gas central suspension system, and emphasizes the importance of avoiding glare. Incidentally Prof. Low recalls the statement that about 25 per cent. of accidents in streets occur at night time, notwithstanding the fact that there is far less traffic during the night than during the daytime. The collection of opinions in this case has helped to direct public attention to the importance of street lighting, and the care taken by the authorities in the choice of their lighting system deserves commendation. We are interested to hear that the city of Bradford, where the question of improved street lighting has for so long been under discussion, is likewise making experiments. In order to decide the relative merits of electricity and gas for lighting the streets of the city, the top half of a new thoroughfare about 1,000 yards long is to be lighted by the Electricity Department, whilst the lower half is to be handed over to the Gas Department. When the equipment is complete it will be inspected by both departments. Data in regard to the candle-power used and the cost will then be obtained, and these will be considered later. This is an enterprising step. Now that Lewisham and Bradford have shown the way it is to be trusted that our inefficiently lighted cities and towns will do likewise, especially those who have "municipalized" both forms of illuminant.



The Second World Power Conference

An important coming event is the second World Power Conference, which is to take place in Berlin during June 16th to 25th. President von Hindenburg has consented to be honorary patron of the Conference. His Excellency Dr. Oskar von Miller, the creator of the Deutsches Museum and a pioneer in the electrical industry, is hon. president, and Dr. C. Kottgen undertakes the duties of chairman. The German National Committee, located at Ingenieurhaus, Berlin, N.W.7, is a representative body, including in its ranks Government officials, professors at technical colleges, the leading scientific and engineering bodies, the Imperial railways and other public institutions.

The conference, for which much preparatory work has been done, will be on an impressive scale. About 400 papers have been submitted, and the chief countries of the world will be represented. We are glad to observe that many eminent engineers and physicists will be in Berlin. Prof. Eddington's address on "Subatomic Energy" and Prof. Einstein's talk on "The Physical Space and Ether Problems" will no doubt prove to be prominent features. Visits to many important industrial undertakings and electrical-transmission systems will be arranged, and excursions to the chief beauty spots in the neighbourhood of Berlin are being organized.

We are interested to note that the programme contains some papers dealing directly with lighting problems. The list includes a contribution by Mr. C. W. Sully, on "Illumination as a Factor in the Sale of Electricity," and there are other papers by Herr B. Seeger (Germany), Professor G. Klein (Austria), Mr. M. E. Sampsell (U.S.A.), and Professor S. Maisel (Russia), which deal with varied aspects of illumination.

A Conference on Illuminating Engineering in Russia

From time to time one gets glimpses of progress in illuminating and engineering in Russia, where occasional conferences on the subject are now being held. No doubt Professor Maisel's coming paper, alluded to above, will prove informative. Meantime we observe, in a recent issue of the *Russian Electrical Review*, a summary by Mr. Slookhay-Natalchenka of an important conference (apparently the second of its kind), which took place in December last. Apparently 86 papers in all were presented, and the conference was divided into four sections, dealing respectively with (1) economics and planning, (2) sources of light, (3) educational and scientific principles, (4) standardization and (5) propaganda. We hope to obtain in due course further details of this conference and fuller particulars of the subjects discussed.

Light and Architecture

We notice in *L'Illuminazione* evidence of keen interest in Italy in the most novel aspects of decorative lighting. Architects in that country are interesting themselves in fitting design. Thus Sig. A. C. Ramelli describes numerous types involving the use of diffusing glass plates and tubular light sources. There are also notes on cornice lighting and some striking examples of illuminated signs installed in South America.

A Portable Direct-Reading Photometer

For many years photometric experts have had before them the aim of producing a portable direct-reading photometer which would merely need to be placed in position and exposed to the light and would then register foot-candles by the movement of a needle over a dial. Such an instrument, if sufficiently robust and reliable, would obviously do a great deal to popularize measurements of illumination. The method almost necessarily involves the use of a photo-electric cell, and the difficulties in the way of producing a practicable portable instrument are manifest. We understand, however, that as a result of recent researches considerable progress has been made in this country. Meantime we note in the *Journal of the American Institute of Electrical Engineers* a description by Mr. J. L. McCoy of an instrument of this type. The photo-electric cell is protected by a shield in the side of which a window is cut to admit the light to be measured. The cell contains two essential parts, an anode and a cathode, the latter coated with light-sensitive material. As is well known, the response in various regions of the spectrum depends much on the make-up of the cell. Types can be produced which respond only to radiation in the ultra-violet. The cell used in this instrument has an exceptionally broad response, covering practically the whole of the visible spectrum. When applied to measure illuminations in use in film studios the response of the cell closely resembles that of a panchromatic film used in conjunction with incandescent lamps. A noteworthy feature is that the cell unit is connected to the commercial micro-ammeter, calibrated directly in foot-candles, by means of a 6 ft. cord. The cell can thus be moved about into position whilst the case containing the instrument and battery is stationary. Energy is furnished by a small dry battery. The current taken is minute and the life of the battery is stated to be practically the same as the "shelf life."

Park Lighting in Paris

It is not so long since the question of lighting the London parks was brought prominently before the public. We observe that according to *Lux* the same question, in a somewhat different form, has been raised in Paris. The need for better lighting of ways traversing the large parks in the vicinity of Paris, where the traffic is now vastly greater than in the past, is keenly felt. At present most of these roads, for example those traversing the Bois de Vincennes, are destitute of public lighting, and owing to the dark surroundings and trees the glare of automobile headlights becomes especially embarrassing. "It is unfortunate," it is remarked, "that one should be able to affirm that accidents due to lack of illumination may occur in a park in the 'Ville Lumière.'"

An Historic Telephone Call

We understand that Mr. H. Hepworth Thompson, managing director of Holophane Ltd. and a member of Council of the Illuminating Engineering Society, in the course of a recent visit to South America took part in an historic event. He was the first man to speak on the telephone from Brazil to London.

TECHNICAL SECTION

COMPRISING

Transactions of The Illuminating Engineering Society and Special Articles

The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

Luminous Traffic Signals

(Proceedings at the Meeting of the Illuminating Engineering Society held at the House of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C., at 6-30 p.m., on Tuesday, May 6th, 1930.)

A MEETING of the Illuminating Engineering Society was held in the House of the Royal Society of Arts (18, John St., Adelphi, London, W.C.), on Tuesday, May 6th, 1930. Members assembled for light refreshments at 6-30 p.m., and the meeting opened at 7 p.m., when THE PRESIDENT (Dr. J. W. T. Walsh) took the chair.

After the minutes of the last meeting had been taken as read, the HON. SECRETARY announced the names of the following applicants for membership:—

Ordinary Members:—

Bing, F. E., 68, Camberley Avenue, Wimbledon, London, S.W.20.

Crisp, H. D., The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.

Hulance, A. T., Managing Director of Messrs. Bective Electrical Co., Ltd., Phoenix Yard, Princes Street, Cavendish Square, London, W. 1.

Lingard, H., E.L.M.A. Lighting Service Bureau, 15, Savoy Street, Strand, London, W.C.

Maitland, R. Waldo, Architect, E.L.M.A. Lighting Service Bureau, 15, Savoy Street, Strand, London, W.C.

Stratton, E. B., Dymbarn, Park Avenue, Farnborough Park, Kent.

Country Members:—

Hart, G., Engineer to the Education Department of the City of Birmingham, Torrington, Kineton Green Road, Alton, Birmingham.

Sloohkay-Natalchenko, L. E., Pawlowka Bol. Sumskaia, 37, Kharkpw, Ukraina, U.S.S.R.

The HON. SECRETARY also mentioned that Mr. A. B. Wearing, who was formerly a member of the Society had now rejoined.

The names of applicants presented at the last meeting* of the Society were read again and these gentlemen were formerly declared members of the Society.

THE PRESIDENT then called upon Mr. T. AUSTIN to read his paper on "Luminous Traffic Signals." The paper was divided into two sections dealing respectively with railway signals and street-traffic signals. The general use of light signals on railways is a comparatively recent innovation, particularly on surface lines in daylight. The modern light signal has a range of visibility of upwards of 4,000 ft. in the brightest sunshine, and it is possible to give the driver only one signal to observe by day or night, i.e., a coloured signal. The author described the use of red, green-yellow and green lights, in various combinations, on railways and the design of single and multiple lens signals. Such other special devices as luminous route indications and level crossing warning signals were also

discussed. In the second portion of the paper allusion was made to the successful development of automatic and semi-automatic street signals in the United States and Canada, Germany, South Africa and other countries. These luminous signals are likewise based on the use of three-colour system, involving red, yellow (or amber) and green. Mr. Austin described the general method of using such signals. Reference was made to the recent memorandum issued by the Ministry of Traffic on the design of signals, the use of warning signs when automatic controls are about to be encountered on the road, and the design of automatic controlling gear. The paper was illustrated by numerous lantern slides and typical luminous street-signal equipment was shown in operation.

The paper led to an interesting discussion which was opened by Mr. A. CUNNINGTON (Southern Railway). Amongst others who took part were: Mr. L. J. BOUCHER (Signals Department, Southern Railway), Lieut-Commander HAYDN T. HARRISON, Mr. H. H. HARRISON, Mr. H. GUNNER, Mr. G. TWEEDIE (Hon. Secretary Institution of Railway Signal Engineers), Mr. J. M. WALDRAM, Lieut.-Colonel K. EDGEUMBE, Mr. R. N. SAXBY, and Mr. F. G. DOWNES.

After Mr. Austin had briefly replied to various points raised in the discussion a cordial vote of thanks to him for his paper was proposed by the President and carried with acclamation.

Illuminating Engineering Society

(Founded in London, 1909.)

NOTICE OF ANNUAL GENERAL MEETING.

The **Annual General Meeting** of the Society will be held in the Lecture Theatre of the Home Office Industrial Museum (Horseferry Road, Westminster, S.W.1), at **6-30 p.m.**, on **Tuesday, June 3rd**, when the chair will be taken by the President, and the REPORT OF THE COUNCIL for the past session and ACCOUNTS for the past financial year will be presented.

In submitting this record of the work of the Society the Council takes the opportunity of mentioning that the programme for the next session is now being prepared. The Council will welcome offers to read papers or open discussions, and will carefully consider any suggestions in regard to the programme for the next session.

Arrangements for the administration of the Leon Gaster Memorial Fund are now being completed, and it is anticipated that papers presented during the session 1930-1931 will be eligible for the award of the Leon Gaster premium for the best contribution on any aspect of illuminating engineering presented to the Society during this period.

* The Illuminating Engineer, May, 1930, p. 113.

Luminous Traffic Signals

By T. AUSTIN

(Paper read at the meeting of the Illuminating Engineering Society, held at the House of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C., at 6-30 p.m., on Tuesday, May 6th, 1930.)

Introduction.

The subject title of this paper could, if one wished, be construed to cover a very wide field, and some of the subjects which might be dealt with include:—

- Railway signals.
- Street traffic signals.
- Sea lighthouses and harbour signals.
- Air lighthouses and aeroplane starting and landing signals, etc., etc.,

and might even include the telephone traffic signals used on exchange switchboards.

It would be impossible to deal adequately with the whole field of luminous traffic signals in one paper, and it is therefore proposed to confine the present paper to a consideration of some of the features of railway signals and street traffic signals.

As the railway signal belongs to what one might regard as the "senior service," it is proposed to deal with that first.

Railway Signals.

The general use of light signals on railways is a comparatively recent innovation, particularly on surface lines in daylight, although, of course, some form of light signal has always had to be used on underground lines and in tunnels.

The improvements made in glass moulding and the production of satisfactory coloured glass, together with advances made in the manufacture of concentrated-filaments, gasfilled electric lamps, have made the day-light-colour signal a really satisfactory and practical proposition.

It has always been a disadvantage to give the driver of a train a different signal by day from that which he receives at night, but with the modern colour light signal that disadvantage is removed.

It will be realized that with the semaphore signal, and its oil lamp of comparatively low candle-power, there are periods at both ends of the day, particularly in a country like England, with its prolonged twilight, when the visibility of such a signal is very restricted; and indeed there are times during rainy or misty conditions when it is not light enough to see the semaphore and post, and yet not really dark enough to discern the light at any reasonable distance.

The modern light signal completely overcomes the difficulties just mentioned, and it is now possible to produce signals which have a range of visibility of upwards of 4,000 feet in the brightest sunshine; whilst in darkness and under rainy, misty, or similar conditions the light signal shows up to particular advantage. Further, the driver is given only one signal to observe by both day and night, i.e., a coloured light.

The absence of exposed moving parts and general compactness are but two of the many points in favour of the light signal.

Railway light signals can be grouped under two main classes:—

- (a) Long range signals.
- (b) Short range signals.

In addition to the actual driver's signals there are, of course, numerous indicators or repeaters which are in effect signals to the signalman.

Dealing with the long range signals first, we find that these can be subdivided into three types.

- (1) Multiple lens (colour light).
- (2) Single lens (colour light).
- (3) Position light (white light).

Types Nos. 1 and 2 differ from No. 3 in that they employ colours to give the various indications, whereas No. 3 communicates its message by various arrangements of white lights which simulate the semaphore signal.

Colours.

Three colours are usually employed in railway signalling and these are red, yellow and green. These may be combined as two-aspect (red and green), three aspects (red, yellow and green), or four aspects (red, green and two yellows).

The meanings of the aspects are:—

Red: Stop.

One yellow: Caution—be prepared to stop at next signal.

Two yellows: Caution—run at medium speed.

Green: Proceed at usual speed.

It will be realized that for such an important duty as railway signalling the colours employed must be quite distinctive, so that there is no possible risk of any one aspect being confused with another. Further the distinction must be such that variations of atmospheric conditions shall not affect the appearance to the extent of making it unrecognizable.

The transmission must also be high enough to give sufficient range to the signal without an undue expenditure of candle-power, while at the same time retaining the distinctiveness of colour.

The production of these coloured lenses within a reasonably narrow tolerance with regard to colour and transmission values demands considerable technical skill and a high standard of workmanship.

A very high standard of excellence has been reached in America and on the Continent in the production of moulded colour lenses, but it is gratifying to note that English manufacturers are now producing lenses which certainly equal and possibly excel the productions of their foreign competitors.

Multiple Lens Signals.

As the name implies this type of signal has a separate lens for each colour, and the signal consists essentially of a series of compartments, each of which is fitted with an electric lamp and a special lens system.

The lenses employed form what is known as a "doublet combination," comprising an inner coloured lens and an outer clear white lens. The inner lens is an inverted stepped lens of $5\frac{1}{2}$ ins. diameter, while the cover lens is a normal stepped lens of $8\frac{3}{8}$ ins. diameter.

The employment of the white cover lens is to avoid any reflection of coloured light which might lead to an improper phantom indication being given to a train driver.

The beam transmitted has a normal spread of 6° , which is sufficient for the usual

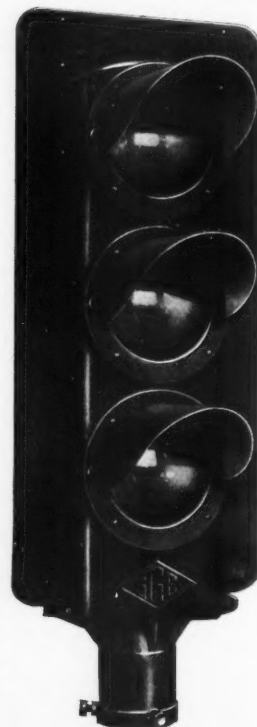


FIG. 1.
Three-aspect Multiple-lens Type Long-range Signal.

curvatures met with on railways, but to cater for sharp curves special cover lenses are employed. These are moulded with prisms on the outer surface giving varying degrees of spread according to the shape and size of the prisms.

The wider dispersion of the beam naturally results in a reduction of the distance at which the signal can be seen, but as the visibility on a sharp curve is restricted the reduction of range is no disadvantage.

As in the standard signal the beam transmitted is nearly a parallel one, it follows that where signals have to be mounted above the line of the driver's vision there may be some difficulty in his being able to see the indication at close quarters.

To overcome this, prismatic deflecting surfaces are built into the outer lens over a small sector giving sufficient area of outward spread to be of use when close up to the signal while not seriously interfering with the main beam.

With the lens combination previously described, it is necessary to use a concentrated-filament gasfilled lamp in order to obtain a sufficiently intense beam, and in this connection it should be noted that reflectors of any kind cannot be used. It will be appreciated that the use of any reflecting surface may lead to dangerous phantom indications being given.

The source of light in this type of signal is a low-voltage lamp having two concentrated filaments and consuming about 16 watts in its main filament. An auxiliary filament of lower wattage and less efficient rating is connected in parallel with the focal filament, so that in the event of a failure of the main filament the signal still gives an indication, although somewhat restricted.

As the focussing of the lens system is very sharp, specially designed lampholders have to be employed.

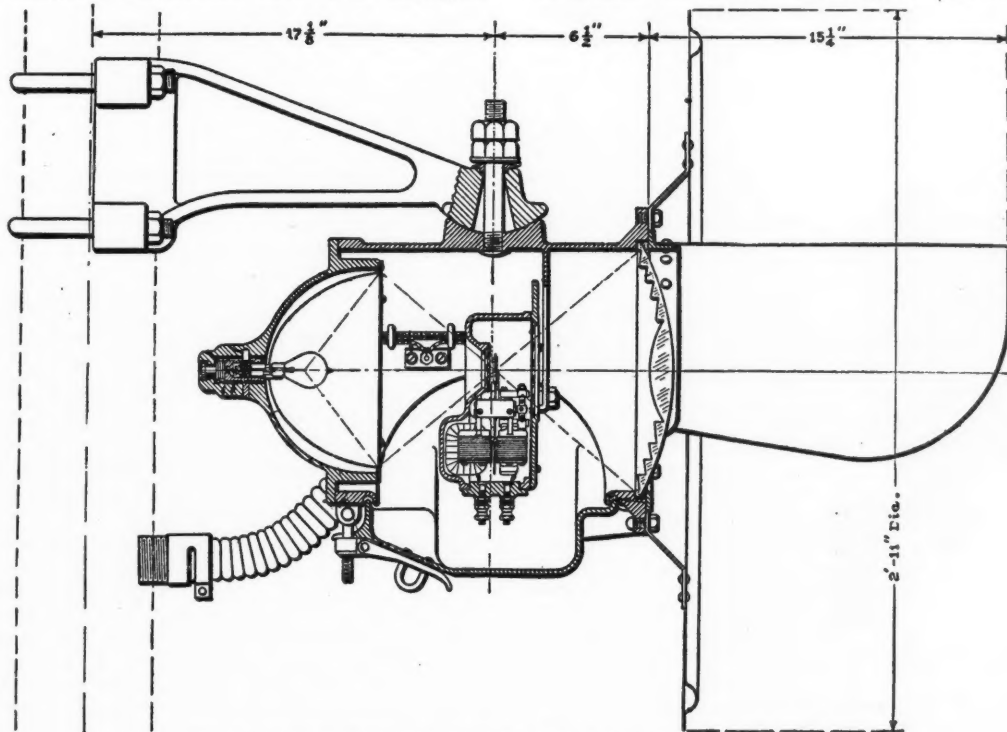


FIG. 2.—Diagram illustrating principle of Single-lens Colour-light Signal.

Adjustment in three directions is provided, and this is carried out at the works, after which the lampholder is securely fixed, and cannot readily be altered.

In order that the exchange of lamps shall not affect the efficiency of the indication, and further that the onus of focussing shall not be placed on the maintainer, the lamps used in these signals are specially capped.

A standard bayonet cap having three pins spaced at equal distances ensures that the lamp is placed in the holder with the filaments in correct relationship with the lens.

The height of the filament with respect to the pins on the cap is adjusted to small limits by means of a brass sleeve fitting inside the cap. Thus within comparatively small limits every lamp is identical.

To align the signal to the track a form of rifle sight is provided on the case, while a conical surface inside the socket at the bottom allows of a limited amount of universal adjustment.

The lamps are usually supplied with current from a small transformer fixed inside each aspect, which converts the high-voltage line supply to 12 volts for the lamp filaments.

Single Lens Signals.

The single lens colour light signal, frequently referred to as the "Searchlight" signal, is designed and constructed so that each colour indication leaves the signal by one lens, and possesses a number of advantages over the multiple lens signal.

In this signal the optical system consists of a clear white outer lens and an elliptical reflector with a concentrated-filament lamp.

The coloured indication is obtained by means of small coloured roundels about 1 in. diameter, mounted in a frame and arranged to be movable at the focal point of the lens-reflector system. The frame holding the roundels is carried by a polarized electromagnetic movement with the red roundel mounted at the centre. This ensures that when no current is passing in the control circuit the red roundel will assume the centre position by gravity and the signal will indicate "stop." To indicate green, the control current is sent through the motor in one direction, while to display the yellow indication the control current is reversed.

As the signal is provided with only one lens it will be evident that there is no objection to the use of a

reflector, and consequently a lamp of considerably less wattage and candle-power can be used as compared with the multiple lens signals.

Improper phantom indications are impossible, as any extraneous light entering the outer lens must pass through the coloured roundel before reaching the reflector.

The lamp employed is a low-voltage concentrated-filament gasfilled lamp and the maximum voltage required to give a satisfactory indication at 4,000 ft. in bright sunshine is 10 watts. The lamps are

accurately capped to avoid the necessity for refocussing when changing lamps.

One advantage in connection with this signal is that the lamp is burning continuously and is therefore free from the damaging effects of switching.

The coloured roundels are made from heat-resisting glass, and this is necessary as the heat of the lamp is concentrated at the point where the roundel is mounted.

This signal, designed some seven or eight years ago, has not received the recognition which, in the author's opinion, it merits, but there is evidence that this type of signal is now coming into favour, and there are already over one thousand signals in use on the Canadian and American railways.

It will be appreciated that owing to its economical performance it is a practical proposition where electrical energy is expensive, and it can even be worked from primary batteries.

Position Light Signals.

The position light signal consists of a number of lamp units mounted in a frame and disposed so that rows of lights can be selected to give three or more indications. Typical indications given are:—

Three horizontal lights: Stop.

Three lights inclined at 45° : Caution.

Three vertical lights: Proceed.

A white light source only is used, thus obviating any misunderstanding due to possible colour blindness, but the outer cover lens is tinted a light yellow, which it is claimed has better penetrating power in misty or foggy weather.

Lamp Unit.

The lamp unit consists of a cast iron case having a door on either side. Each unit has a separate supporting bracket, being attached thereto by four bolts. These bolts provide for universal adjustment in aligning the lamp, through the medium of a ball-and-socket joint. A $5\frac{3}{8}$ -in. inverted toric lens is supplemented by a cover

glass of special "no-glare" composition, which gives the light transmitted a slightly yellowish tinge, rendering it more distinct and providing greater fog penetration. One lamp only is required for each lens. Should one lamp in any line burn out, there still remain two luminous units which provide a satisfactory signal indication. A mirror reflector is mounted so as to deflect some of the rays of light downward, thus providing a good short range indication. This effect is further aided by the use of a toric lens. Phantom indications are avoided by the use of the conical cover glass, which has a frosted tip, and the painting black



FIG. 3.—Short-range Two-aspect Colour-light Signal.

of a portion of the inside lens surface steps. A sheet iron hood shields the lens from the direct rays of the sun.

A low-voltage concentrated-filament lamp is employed, having a rating of approximately 8 watts. The lamp is accurately capped in order to avoid refocussing when replacing lamps.

Short Range Signals.

Under this category can be placed shunt signals, tunnel signals, fog repeaters and marker lights, and similar apparatus.

The construction in the case of signals in this class is somewhat simpler than in the long range signals, and they are as a rule of smaller dimensions.

For short range work a parallel beam is not required or desirable, and it is therefore permissible to dispense with lamp transformers and work with ordinary commercial lamps direct from the mains.

The squirrel-cage type of filament gives the best results, and although only a small portion of the filament is on the actual focus of the lens the remainder helps to give the dispersion which is desirable in signals which have to be viewed at a short distance and over a wide angle.

The lens arrangements is quite simple, merely consisting of a coloured roundel placed behind a clear white stepped lens. The rating of lamp usually employed is about 20 watts.

A variation of this class of signals used for shunting work, where the driver is very often quite out of the beam, employs four small lamps placed right in the lens in an endeavour to provide a very wide angle indication.

It is to be regretted, however, that, successful as light signals have proved for running purposes, a really satisfactory shunt light signal is yet to be developed.

Luminous Route Indicators.

At terminal stations and other places where the running lines branch out into a number of platform lines or sidings, it is desirable to give the driver an indication of the road into which he is to travel. When a separate signal is allotted to each branch line the signalling arrangements become cumbersome and confusing, particularly at large stations. In order to reduce the number of running signals to a minimum, one signal is allotted to each main running road and on the same post is fixed a route indicator. The signal indicates when the line is clear, and the route indicator directs the driver as to his destination.

One form of luminous route indicator is arranged on the principle of the familiar theatre-programme indicator. A number of lamps are arranged in a frame, and to show figures or letters certain lamps are selected by appropriate relays or switches, so that the lamps illuminated form definite characters.

This type of indicator is quite satisfactory as regards the indication at a reasonable distance and under moderately bright daylight conditions. It suffers from a serious drawback inasmuch as the failure of a lamp may alter the shape of the character intended to be exhibited so as to mislead a driver, or it may make the indication unintelligible. Further, it is practically impossible to positively repeat the indication to the signalman.

Another luminous route indicator which has reached a fair state of development is designed on the projector principle.

A series of projector units are mounted in a suitable case, in the front of which is fixed a diffusing glass screen.

Each projector unit is complete with lamp stencil and lens, and each is fed from a separate lamp transformer. The units are mounted in the case in such a manner that when the lamp is lighted a character is displayed on the screen. A deep hood is provided to exclude direct daylight from the face of the screen. The indicator is compact, and a capacity of twelve indications is obtained in a case of approximate dimensions of 36 inches long and 14 inches square.

The height of characters provided in this type of indicator is twelve inches.

The circuit arrangements enable the indicator to be positively repeated in the signal cabin without the use of additional line wires.

Level Crossing Warning Signals.

The large volume of motor traffic on the roads has rendered the adequate protection of level crossings an urgent and important matter, particularly in countries where railways are not fenced and where gates and crossing keepers are not provided.

Many devices have been invented for the warning of road traffic on the approach of a train, but the most satisfactory arrangement so far devised is the flashing light signal.

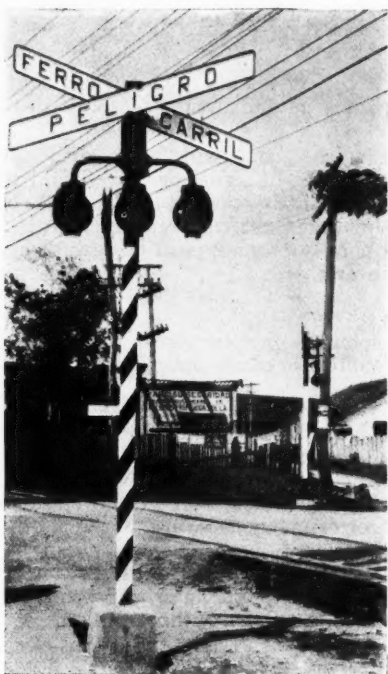


FIG. 4.—A distinctive Level-crossing Signal.

The most usual arrangement is the provision at a suitable distance from the crossing of two light signals arranged about 30 inches apart in a horizontal line. Current is fed to the lamps alternately by means of a flashing relay and with a rate of flash of about 35 to 45 per minute. This gives the effect of a red lamp being waved to and fro, and provides a particularly arresting signal. Normally the signals are unlighted, but on the approach of a train at a point about a mile from the crossing the flashing relay is automatically started and the lights flash until the train clears the crossing.

The units used for this purpose are designed to give a wide spread in order to be visible at a wide angle. The range of visibility aimed at is about 300 yards. The duty is very similar to that required of street traffic signals.

Repeating of Colour Light Signals.

Before leaving the subject of railway signals, it might be appropriate to mention the means by which luminous signals are used to repeat to the signalman the indications given to the train driver.

In the signal cabin is provided an indicator which is really a miniature light signal, and this employs a lamp having a rating of 3 watts.

This lamp is connected across a shunt resistance which is in turn connected directly in series with the supply wire to the signal transformer. The current flowing in the circuit produces a difference of potential at the terminals of the resistance, and this serves to light the repeater lamp.

A separate transformer is provided for each lamp in the colour light signal, and as the current in the primary winding of the lamp transformer is proportional to the output on the secondary side it follows that if the main filament of the signal lamp burns out a considerable reduction of current will take place in the primary circuit.

With the normal signal current flowing, the lamp in the repeater will glow at normal brilliance, but should one filament of the signal lamp burn out the load on the signal transformer will be lessened and the voltage across the repeater lamp will be reduced.

By choosing a suitable value for the shunt resistance,

the variation of brilliance at the repeater lamp can be made sufficient to call immediate attention to any alteration in the working of the signal lamp.

It will be appreciated from what has been said that the railways have not been slow to realize the undoubted advantages to be gained by the use of luminous signals and indicators. It will be clear, however, that the general employment of luminous signals is not an economic proposition unless cheap electric energy is available.

STREET TRAFFIC SIGNALS.

Introduction.

The rapid growth of road-borne traffic among recent years has inevitably produced problems in its regulation calling for urgent solution.

The concentration of vehicles of all descriptions in the streets of towns and villages undoubtedly necessitates organized and efficient control if the traffic of the roads is to be dealt with in a safe and expeditious manner. No one will deny that human control in the form of the traffic policemen is as perfect as it is possible to make it, but it is not unreasonable to expect that in these days of automatic appliances the human element can be assisted and economized.

That the adoption of automatic or semi-automatic street signals is a practical proposition is attested by the fact that automatic signals have been in successful use for several years in many towns of the United States and Canada, and also in Germany, South Africa and other countries.

The psychology of the public must, of course, be taken into account when considering the adoption of a new device which at first sight may appear to interfere with or restrict the liberty of the individual. When, however, the road-using public, whether vehicle driver or pedestrian, realizes that to obey the automatic traffic signals means expeditious and orderly movements, coupled with safety, then all possible objections to such signal disappear. As for the small minority of rash or inconsiderate people who are to be found in every community, the police can be provided with effective means for bringing them into line in the interests of safety.

Good as undoubtedly are the other reasons in favour of automatic signals, the economic aspect is the one which will appeal most strongly. Economy in this subject can be considered to be made up of several factors, among which the saving of police man-power, while appearing the greatest on paper, is probably the least. Expeditious movement combined with safety are two factors the economic value of which cannot be computed in figures, but which must, in the long run, be of considerable value to the community.

Man-power or Signals.

The use of the most efficient officers of a police force in the regulation of street traffic not only entails the depletion of the force of many of its best members, but also involves the expenditure of a large amount of public money.

With the growth of traffic volume the authorities are faced with three propositions, viz.: (1) To leave certain cross-roads unattended, with consequent risk of congestion and accident; (2) to engage more men, at a corresponding increase of expense; (3) to install automatic traffic signals, and so increase the scope of the existing personnel.

By the use of traffic signals, police officers are released from a duty in which they are, for the greater part of their time, mere human semaphores; and, instead of being employed in a more or less mechanical way, can become—as they should be—traffic supervisors.

It will be apparent that with traffic signals one officer could supervise a number of street intersections, and, moreover, he is available to give information, assist the infirm, and generally superintend the traffic in his area.

Traffic Signals—General.

Many forms of signals have from time to time been tried in various parts of the world, some of which have been crude devices manually operated by the traffic policeman, but all intended to facilitate the movement of traffic.

Semaphore signals have the disadvantage of requiring mechanism for their operation, and, under modern street conditions, are of doubtful visibility.

Experience has shown that the modern colour light signal provides the most distinctive and noticeable indication. It also has the advantage of being free from moving parts, and, consequently, its maintenance is restricted to the occasional changing of lamps.

Three colours are generally used, as in railway signalling, namely, red, yellow or amber, and green.

The green and red mean "Proceed" and "Stop" respectively, as in the case of the railway signal, but the yellow has not quite the same meaning. In railway signalling the yellow definitely indicates "Caution," the next signal ahead is at "Stop," and so tells the driver to get his train under control and be prepared to stop.

In the case of street signalling the yellow indicates that a change in the direction of traffic flow is about to be signalled, and it does not necessarily infer that if the next indication is "red" a driver must stop because he may be going to make a left-hand turn. The general opinion seems to be that the word "caution" is too ambiguous, and consequently it is not now usual to put any lettering on the yellow lens.

The use of electricity in the control of traffic signals enables the maximum flexibility to be obtained. An

automatic timing device is employed, and this is provided with simple control dials which allow of wide or narrow variations of timing in any particular direction. Manual control can be resorted to when occasion arises, and, in addition, the signals can be put out of use completely or left indicating a steady or flashing yellow as desired.

Cost.

The first cost of installation of traffic signals is very moderate when judged in comparison with the savings they can effect.

Obviously the cost will vary with the number required, the type of signal employed and the style of posts and other fittings used; but, in a general way, it may be said that the return on the capital involved in equipping a busy crossing will be several hundred per cent. in the first year.

Systems of Control.

The systems of controlling street traffic signals divide themselves into five main groups as follows:—

(1) Manual Control.

This method is used where the traffic is very complex, and the signals are employed as a more visible traffic officer, giving unmistakable signals in situations where the policeman is almost lost in the maze of vehicles. The operator can be housed in a tower or other point of vantage where he is out of danger and can see the whole of the traffic; and, moreover, the traffic can be regulated more satisfactorily by one man with traffic signals than by two or even three men without signals.

(2) Local or Independent Control.

This is similar to No. 1 and applies to isolated intersections which are not controlled with any relation to other crossings. The manual switch operated by the policeman is in this case replaced by an automatic controller worked from the local lighting supply.

(3) Synchronized Control.

The simplest form of control where a series of right-angle streets lead off a main street. In this case the signals at the various intersections are "synchronized," that is to say, all signals show the same colour in the same direction simultaneously. The signals are synchronized by automatic controllers at each intersection, or can be worked from one controller by means of interconnecting cables.

(4) Staggered Control.

This method is similar to the synchronous control in that all the signal indications change simultaneously. It differs, however, because the indication at the various intersections are "staggered," i.e., alternately "stop" and "go." It is suitable only where blocks are of equal length, and under these conditions allows the traffic to proceed at a predetermined speed. The operation is effected in the same way as with synchronous control.

(5) Progressive Control.

As its name implies, this method is the most flexible of the automatic controls. It is particularly suitable for thoroughfares where the blocks are of unequal length, and the timing of the signals is so devised as to allow traffic running at a certain speed to proceed with stops. The signals at each intersection are controlled by local controllers, and these are in turn actuated by a master controller. The wiring of the signals at the intersection is local, but two control wires are required between the master controller and the separate local controllers.

Under this system, waits, if any, are very short, pedestrian traffic is facilitated, and the average speed of vehicles is kept within safe limits.

Signal Location.

The location of the signals is of the utmost importance and is a matter which requires careful consideration if they are to be positioned to the best advantage.

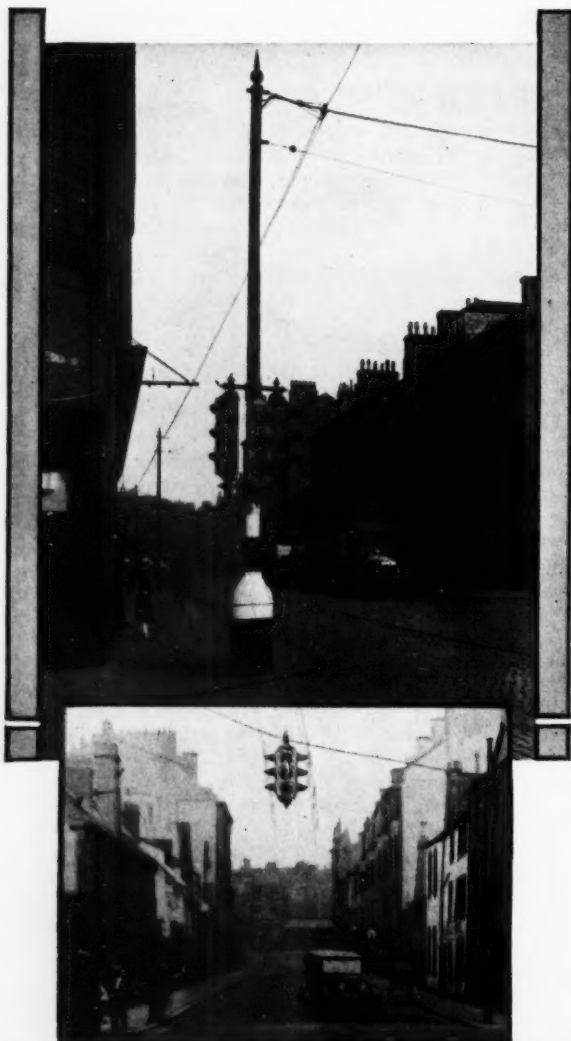


FIG. 5.—Typical Street-traffic Signals: (Above) Bracket-type Signals. (Below) Suspended Signal.

A variety of positions can be used, some of which are indicated below.

- (1) On a control tower in the centre of the crossing.
- (2) On a span wire over the centre of an intersection.
- (3) On overhung brackets from poles on the near side of the kerb and on the near side of the crossing.
- (4) Single signals on posts on the near side of the kerb and on the near side of the crossing.
- (5) Single signals on posts on the near side of the kerb and on the far side of the crossing.
- (6) Double signals on posts on the near side of the kerb and on the near side of the crossing.
- (7) Triple signals on posts on the near side of the kerb and on the near side of the crossing.

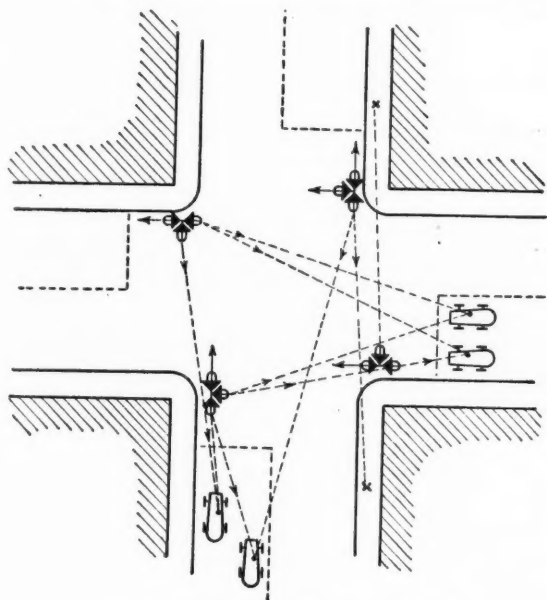


FIG. 6.—Diagram illustrating Method No. 7.

Where single signals on posts are used, method No. 5 is recommended, as a driver cannot draw up underneath or beyond the signal, from which position it would be invisible.

Method No. 6 is a better scheme as it provides two signals for the observance of a driver and also provides the pedestrian on the far side of the crossing with an unmistakable indication.

The most comprehensive scheme, however, is method No. 7, which employs three signals at each corner of

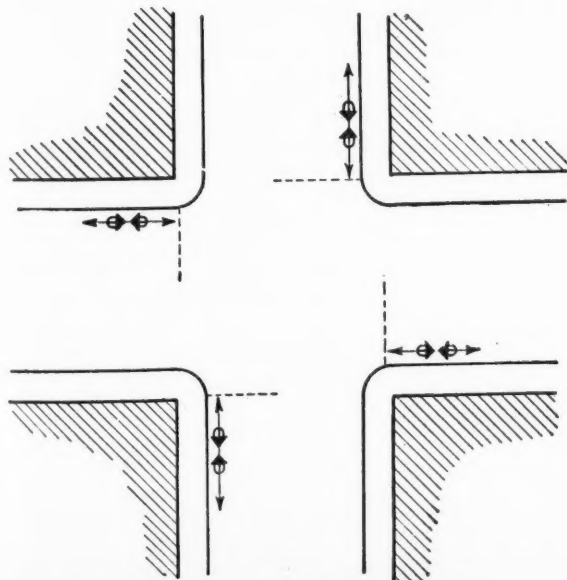


FIG. 7.—Diagram showing Two Signals at each Corner.

the intersection. This method combines the advantages of all the other preceding methods.

Under this arrangement vehicles approaching the intersection have in view two signals on the far side of the crossing and one on the near side, while pedestrians have one signal in view directly ahead in whichever direction they cross at an intersection. There can be little or no excuse for either vehicular or pedestrian traffic not being able to observe the signals.

Signal Indications: Three Indications.

Used in its simplest form, the three-aspect signal gives the following instructions to street traffic:—

Red means "Stop."

Yellow.

Green means "Proceed."

The yellow indication serves to warn the drivers of vehicles of an impending change from red to green, or green to red, as the case may be, and also indicates to pedestrians that a change in the direction of traffic flow is about to take place.

Four Indications.

Experience has shown that a fourth indication can be used to advantage, and the following sequence of indications will be found to give the most explicit and comprehensive instructions.

They should take place in the order stated, viz.: (1) red, (2) red and yellow together, (3) green, (4) yellow, (1) red, and so on.

The colours are to be interpreted as follows:—

- (1) Red means "Stop" before entering the intersection, and remain standing until green is shown.
- (2) Red and yellow together mean prepare to start when green is shown.
- (3) Green means permission to go either straight ahead or to right or left, subject to the safety of others.
- (4) Yellow alone (after green) means "Stop" before entering the intersection, unless the vehicle is too close to the crossing to be stopped with safety, in which case it should proceed and get clear.

Length of Cycle of Indications.

The length of the complete cycles of indication deserves careful study, but it will generally be found that short cycles are preferable to long ones. For ordinary crossings a traffic cycle between 40 seconds and 80 seconds will be found to meet most requirements, as with such a period the maximum traffic flow can be maintained while at the same time obedience to the signals by drivers is encouraged. Longer cycles produce a tendency to non-observance of the signals by impatient drivers and pedestrians, whilst very short cycles seriously reduce the traffic capacity of the streets controlled by the signalling system.

No definite rule can be stated with regard to the length of cycle to be adopted, as this will have to be determined by careful analysis of all the traffic factors involved, and may require to be adjusted after trial, to suit the actual traffic conditions at various times of the day.

"Caution" Period.

The period of the red and yellow shown together in one direction will coincide with the period of the yellow shown after green in the direction at right angles.

The most suitable length of the "Caution" period will be found to be 3 to 5 seconds.

The Ministry of Transport, in their Memorandum No. 297, show themselves to be in favour of using three signals on each corner of an intersection, as this method affords the maximum amount of indication to vehicular traffic and pedestrians alike. There are many places, however, where it is difficult suitably to fix three signals, and it appears to be generally felt that the method of having two signals per corner meets all requirements, both pedestrian and vehicular.

To render the position of the signal standards more readily visible the Ministry of Transport recommend that the signal post should be surmounted by a yellow glass globe of 12 ins. diameter, the globe to be illuminated from within at night time. This recommendation does not appear to be regarded with much favour, the general view being that there are sufficient lights already, and the yellow light over the signals is liable to be confusing. Moreover, the yellow globe is an extra expense.

Four-way signals fixed in the centre of an intersection are not altogether a success. Signals suspended on wires over the roadway must be high enough to be clear of high loads or trolley wires, and in that position are not easily seen from closed cars. On the other hand, islands are objectionable in many situations, on account of the obstruction they form to the flow of traffic. Signals fixed on poles or brackets on the pavement are generally more satisfactory.

The illumination of a green arrow pointing in the direction of a left-hand turn (for left-hand running) when the red indication is exhibited would appear to be advantageous, as it would remove any doubt as to the right of a driver passing the red light if desirous of making a left-hand turn.

With regard to the signal for pedestrians, some authorities favour the use of a smaller signal instead of employing two normal-sized units. The intention seems to be to give the pedestrian an exclusive instruction as distinct from the indication to the vehicular traffic, and so save any misunderstanding.

It is doubtful, however, if the separate pedestrian signal achieves its object, besides adding indications to the signalling system. The overlapping of the yellow and red indications, as recommended by the Ministry of Transport, appears to meet all requirements of pedestrians and drivers alike.

Equipment (Signals).

The requirements to be met in the illumination of the street signal differ considerably from those of the railway signal. The railway signal is required to throw its beam a maximum distance, and consequently the light is collected and concentrated with that object in view.

The lens systems used for railway signals are therefore unsatisfactory for street work.

The main cases of the signals are made of cast iron, aluminium, or sheet iron, having separate hinged frames carrying the lenses or roundels.

Two optical systems have been tried, the lens system and the mirror system. The mirror system is in more general use, as it provides a flexibility of construction which is not so readily obtainable with the lens system.

An individual mirror and lamp is provided for each indication and in each direction, so that a four-way signal has twelve mirrors, lamps and lenses.

Specially designed diffusing lenses or roundels are employed in combination with a mirror, with a view to obtaining a maximum of intensity of illumination together with wide dispersion.

The size of indication most commonly employed is 8 ins. in diameter, or 8 ins. square in signals employing square roundels.

Standard gasfilled lamps, usually of 60-watt rating, are employed.

Some authorities in England, notably Birmingham, are installing signals having an indication of 12 ins. in diameter, it being claimed that the larger opening provides greater noticeability. With a given candle-power rating for the lamp, however, the intensity of illumination must obviously be less than with the 8-in. indication, and it is a moot point as to whether the increase of noticeability is due to the larger diameter lens or to the larger target provided by the greater bulk of the signal case.

There are many towns where difficulty would be experienced in providing space for the 12-in. signal, and indeed some of the older towns with narrow streets find trouble in suitably placing the 8-in. signal.

It has been usual up to now to provide a legend on the red and green lenses, namely, "Stop" and "Go," but

the necessity for this will no doubt disappear as the significance of the colours becomes more understood. In the signal used by the Birmingham authorities the wording is not incorporated on the lens, but a separate illuminated compartment is provided below each lens, illuminated by reflection from the same source as the corresponding lens.

It is, of course, very necessary that motorists and others should be advised, on entering a town or district, that automatic signals are in use, and the Ministry of Transport has very rightly issued recommendations for the design of a suitable sign. To render the sign visible at night it is an advantage to place it near to a street lamp, or, alternatively, to arrange for it to be flood-lighted.

Automatic Controlling Gear.

The automatic timing switch or traffic controller consists of a number of switches or contactors actuated by a small electric motor through gearing.

(1) The controller must provide adjustable means of carrying out the following functions:—

- (a) Variation of the main period, i.e., the total time cycle.
- (b) Variation of the ratio of time allowed to each direction of traffic.
- (c) Variation of the length of the yellow period.

In addition, it is usually desirable to incorporate a hand switch, so that the automatic working can be dispensed with and manual control assumed if desired.

The latter feature complicates the internal arrangements of the controller, and obviously increases the cost. It is doubtful whether the extra facility is needed at 90 per cent. of intersections, the case being met by merely switching off the signals when automatic working is unnecessary or undesirable.

It is essential that adjustments of the controller shall be as simple as possible, and to this end dials are provided on the front panel with movable knobs fitted with pointers.

Where alternating current is available synchronous motors are employed, running at a comparatively high speed and geared down to drive a camshaft at a speed round about 1 rev. per minute. The camshaft actuates contacts arranged to open and close the lamp circuits in correct sequence.

The motors are usually of the induction disc type, consisting of an electro magnet with a shaded pole and an aluminium disc. Variable speed of the motors is obtained in several ways, one of which is effected by rotating the shading pole causing the disc to revolve faster or slower. Further adjustment is also obtained by a variable-speed gear.

In another type of controller high-speed motors are eliminated, the timing of the signals being effected by a thermostatically controlled step-by-step motor which revolves at a very slow speed.

It will be obvious that a great deal more may be said on this subject, but it will also be realized that street signalling is still in its development stage, and that what promises to be standard practice to-day has become obsolete to-morrow.

It is hoped, however, that sufficient has been touched upon to provoke a good discussion, and that other members will select specific sections of the subject and come forward with papers dealing with details.

The paper led to an interesting discussion which was opened by Mr. A. CUNNINGTON (Southern Railway). Amongst others who took part were: Mr. L. J. BOUCHER (Signals Department, Southern Railway), Lieut.-Commander HAYDN T. HARRISON, Mr. H. H. HARRISON, Mr. H. GUNNER, Mr. G. TWEEDIE (Hon. Secretary, Institution of Railway Signal Engineers), Mr. J. M. WALDRAM, Lieut.-Colonel K. EDGUMBE, Mr. R. N. SAXBY, and Mr. F. G. DOWNES.

This discussion, and Mr. Austin's reply thereto, will appear in our next issue.

POPULAR & TRADE SECTION

COMPRISING

Installation Topics—Hygiene and Safety—
Data for Contractors—Hints to Consumers

(The matter in this section does not form part of the official Transactions of the Illuminating Engineering Society and is based on outside contributions.)

The Floodlighting of the New St. James's Park "Underground" Building

By an Engineering Correspondent.

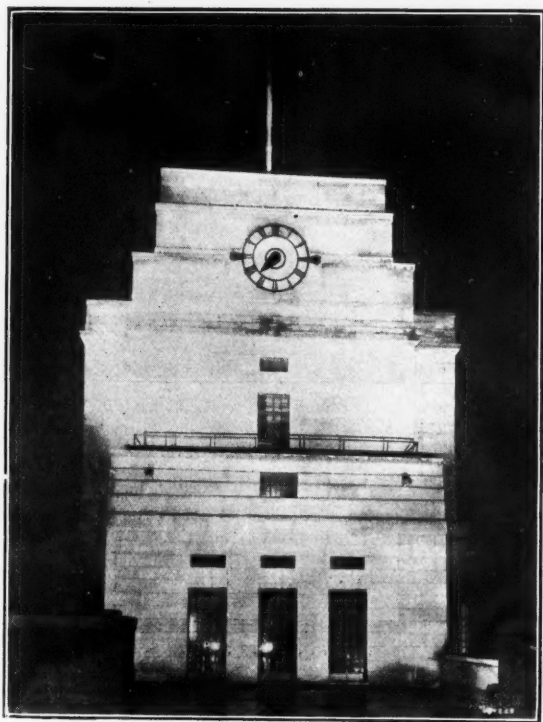


FIG. 1.—A close view of the Illuminated Tower.



FIG. 2.—The Tower as seen from a distance.

THE new St. James's Park underground building, which has recently been completed, has attracted a considerable amount of public attention. The controversy which raged over the matter and manner of Epstein's sculpture has, perhaps, caused other features of this fine piece of work to be overlooked.

Predominant among these features is the tower, the first stages of which rise from the flat roof of the tenth floor. Simple in conception and free from ornate decoration, the tower is floodlighted on its four sides by means of B.T.H. floodlight projectors located on the back well of roof. These projectors provide the general illumination, while smaller lighting units are used to counteract shadows on the receding frontages. On two sides of the tower there are porticoes, and similar reflectors are housed at the base of the columns, increasing the intensity and minimizing the flattening effect which would otherwise be apparent on the pillars. B.T.H. rectangular flood lanterns located close to the building face illuminate the base of the tower.

This floodlighting installation was designed by the

illuminating engineers of the Edison Swan Electric Co., Ltd., in conjunction with the architect. The two accompanying illustrations give a good idea of the effect.

Sir Hugo Hirst, Bt., wins the Two Thousand Guineas

Sir Hugo Hirst's "Diolite," ridden by Fox, proved an easy winner of the Two Thousand Guineas at Newmarket, on May 7th. There was a record field of 28 runners and "Diolite" scored by two lengths.

It was a well-deserved and popular success, and Sir Hugo, who has been interested in the turf for a number of years, is to be congratulated on now owning a great classic winner.

His many friends, and especially those in the electrical industry, will doubtless now look forward to his winning the Blue Riband of the Turf next month with this worthy son of Diophon.

E.L.M.A. Lighting Service Bureau Exhibit at the I.M.E.A. Convention, Eastbourne, 1930

The Electric Lamp Manufacturers' Association is displaying a number of interesting exhibits bearing on the subjects of electrical advertising and shop lighting on the stand which is constructed in such a manner as to show various architectural lighting features.

Six vertical luminous columns in the interior are arranged to provide recesses for accommodating the displays. These columns are designed on novel lines, so that a brilliant green surface is shown in direct contrast to a surface illuminated by red light, thus providing a very unique lighting effect in the interior.

One of the most interesting features of the stand is the miniature sign exhibit which is arranged on three panels to represent three windows looking out on a dull city area with drab buildings visible in the foreground. Miniature signs are arranged to light up in a realistic manner on these buildings, and springing into life they transform the dull city area into one of interest and gaiety. Each sign display is designed to demonstrate one of the factors which is of importance in electric sign design, as, for example, colour, individuality, legibility, etc.

Another luminous display which is of considerable interest is that indicating the progress in shop lighting for a number of years. This display is carried out in luminous surfaces representing the increased magnitude of the load taken by shops for successive years and is of particular interest to supply engineers, since it indicates the value of the shop-lighting load to the central station.

Other displays include a fascinating coloured lighting display incorporating a bronze model and a picture lighting demonstration, together with illuminated recesses, etc. Various types of electric signs are shown in full size, and the exterior of the stand incorporates built-in luminous features of novel design.

Playing Baseball by Artificial Light

The playing of football by artificial light appears to be quite a feasible process. Football games were, in fact, played under these conditions many years ago, and very much more perfect lighting arrangements have been provided for recent matches played in this country, in Holland and in the United States.

The lighting of a baseball arena is obviously a more difficult problem, though this, too, has apparently been tackled successfully in the United States. It may be recalled that an exhibition game was played by artificial light at Lynn, Mass., in 1927, and the idea of making such games a regular feature in the programme has been under consideration since. Now, according to the *Electrical World*, the Des Moines team, of the Western Baseball League, expects to play all its week-day games in 1930 on a ground floodlighted by 146 projectors mounted on six towers 90 ft. high.

Whether adequate artificial lighting to enable important games of cricket to be played at night could be contrived remains to be seen. This would seem to be a more difficult problem than lighting a baseball ground. At present one can hardly imagine artificial lighting in regular use at Lord's or the Oval. Cricket, after all, is a long summer-day pastime. One could hardly imagine prolonged games being played throughout the night. On the other hand, artificial light might prove a useful supplement during periods when games would otherwise be hung up, owing to defective natural light, or when a short prolongation of play might be desirable in order to finish a match.

Industrial Floodlighting

The current issue of the *Kandem Quarterly Review* contains a descriptive article dealing with some industrial applications of floodlighting. Whilst this form of lighting is being increasingly applied for advertising and spectacular effect it is also proving useful in enabling many forms of productive work to take place at night. Instances are afforded by the railways and docks, and by road-repair work—all operations which involve much night work.

A particularly interesting application of floodlighting is in mines and quarries. The diamond fields of South Africa have been mentioned as a conspicuous example. In the journal before us a description is given of the floodlighting of a limestone quarry, which is approximately 1,350 ft. long and 600 ft. wide. The projectors are mounted in such a way as to direct light on the working face, and the beams cross so that the work is fully illuminated without troublesome shadows. An illumination in a vertical plane of 1 to 1.5 foot-candles is provided and the horizontal illumination is of the



A view of a Limestone Quarry floodlighted at night.

order of 0.3 to 0.6 foot-candles. The projectors are mounted at a distance of about 600 ft. from the working face of the quarry. Each projector is equipped with a 1,500-watt lamp, all being mounted on high masts. For this large area only six projectors are needed.

Reference may be made to one special advantage of floodlighting for this form of work—the fact that the units, being distant, are not affected by the force of explosions in blasting. Originally lighting was afforded by lamps mounted on portable poles. This system was not only inefficient but was open to the drawback that the poles had to be removed to a safe distance whenever blasting was undertaken. Even so, lamps and globes were frequently broken and much time was wasted in removing poles and setting them up again. By the use of floodlighting projectors, which can be permanently mounted at a safe distance, this difficulty was completely overcome.

The above illustration, for which we are indebted to the courtesy of Messrs. Korting & Mathiesen Electrical Ltd., gives a good idea of the effect. In the foreground one of the projectors, mounted on a mast, is visible. It will be noted that the area illuminated is considerable. The floodlighting serves not only to assist the actual quarrying operations but also the transport of materials.

This issue of the *Kandem Quarterly Review* also contains an illustrated account of the successful lighting installation of the Stadium at Amsterdam with "Kandem" fittings, which has been put into operation recently.



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3296

THE BRITISH THOMSON-HOUSTON CO., LTD., CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

TRADE COUNTERS: Crown House and 3-7, Wenlock Road, N.1.

The Use of Acetylene Lighting in Tunnels

IT will be recollected that at the opening meeting of the Illuminating Engineering Society in November, 1928, Mr. A. Cunningham described an application of acetylene lighting for illuminating work on railway track, the special feature being the use of a considerable number of burners supplied from one ordinary flare-light generator. (See *The Illuminating Engineer*, December, 1928, page 348.)

This system has now been extended for use in railway tunnels, and the details of the method have been the subject of a considerable amount of experimental work which has resulted in a very useful lighting scheme. The idea of applying acetylene lighting to tunnels in some more systematic way than the use of a large number of separate flare lamps was first mooted by



FIG. 1.—Showing the general effect of acetylene lighting in tunnel.

Mr. Ellison, the chief engineer of the Southern Railway, some two years ago and the application now described of "Milne" type acetylene generators for working a series of burners tapped into a pipe line has been developed by Mr. H. M. Dobinson, one of the lighting inspectors on the railway, under whose guidance and inspiration the whole of the experimental work has been carried out.

It has been found that with the Milne No. 2 acetylene flare generator a pressure of 20 ins. (water column) is available, and with such a pressure a considerable number of burners can be worked from one generator. A pipe line $\frac{3}{4}$ in. in diameter is used, with burners about 25 ft. apart, and in this way it has been found possible to illuminate a length of tunnel equal to about 20 chains with approximately 50 burners run from one generator.

The generators have, for reasons of safety and convenience in handling, been fixed just outside the tunnel mouth, but in long tunnels extra generators have been fixed towards the middle in the refuges provided for permanent-way men. These generators can be used to boost up the pressure of gas available, or as a stand-by in case of failure of the generator normally in use.

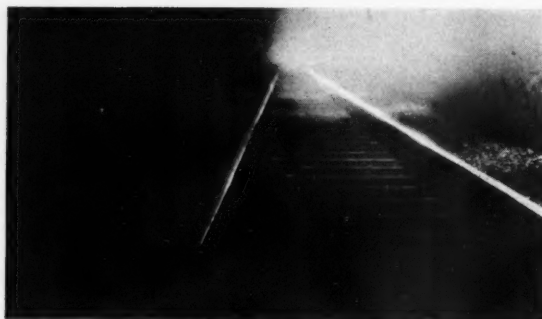


FIG. 2.—Another view, showing how clear a view is obtained of the track and how slight variations in alignment (as evident in the rail on the left) can be detected.

By arranging the pipe lines in various sections and by the provision of separate taps to control each individual burner, any part of the tunnel, or the whole of it, can be lighted at any time, night or day. In some cases it has been found desirable to fix a permanent pipe line on one side of the tunnel only, supplementing this with a temporary run of burners on the other side during the work of relaying the track. A special feature of this system of tunnel lighting has been the readiness with which it enables the track alignment to be carried out. The reflection of the bright lights from the surface of the rail and the absence of smoke, which was so prevalent with the usual oil duck-lamps, have contributed to give a very good view of the track to anyone making an inspection. Fig. 1 shows the general effect of the tunnel lighting and Fig. 2 is part of a photograph which shows how clear a view is obtained of the track.

No serious trouble has so far been experienced with frost, owing no doubt to the absence of really low temperatures within the tunnels, but in anticipation of possible difficulty with saturated gas a drier has been developed by Mr. C. S. Milne which up to the present has given very good results and, it is hoped, will be a safeguard against difficulties with frost in a severe winter.

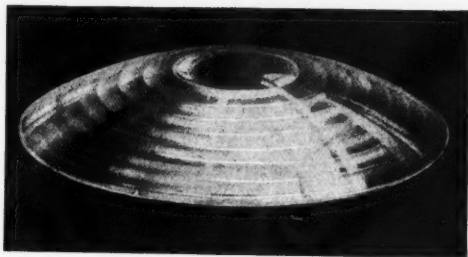
Holophane Contractors' Conference

On Tuesday, May 16th, a conference of contractors was arranged in the lecture theatre of Holophane Ltd. Mr. H. Hepworth Thompson, managing director, gave an address of welcome at 10-15 a.m., and presided throughout the entire proceedings. After Mr. W. T. Dean had dealt with "Sales Policy," there were a number of addresses which served to illustrate various applications of the Holophane system of lighting. Amongst these may be noted Mr. E. Stroud's contribution on "The Scientific Basis of Holophane Lighting," an illustrated account by Dr. S. English of "The Properties and Manufacture of Holophane Glassware," and a lecture by Mr. L. M. Tye on "Practical Applications of Holophane." In the afternoon a colour demonstration was given by Mr. R. Gillespie Williams. Many of our readers have witnessed some of these experiments in the Holophane demonstration theatre. The value of colour lighting for musical interludes in the cinema or theatre was demonstrated by a changing Eastern scene. Numerous experiments were performed illustrating how completely coloured scenery, curtains or dresses may change their character when subjected to coloured light. Lunch took place at St. Ermine's Hotel between the morning and afternoon sessions, and dinner at the Criterion concluded an interesting and successful day.

BRITISH MADE LENSES FOR DAYLIGHT ELECTRIC SIGNALLING

The lenses illustrated are the product of 100 years' experience in glass-making, backed by a unique knowledge of lens construction and scientific optical glass. Each lens is scientifically tested and guaranteed for Colour, Transmission and Beam performance.

Stepped Dioptric Pattern



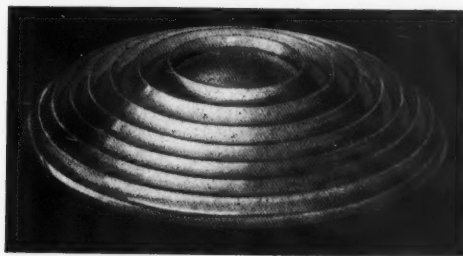
Sizes range from 4" to 8 $\frac{3}{8}$ " dia.

Flat and Convex Roundels



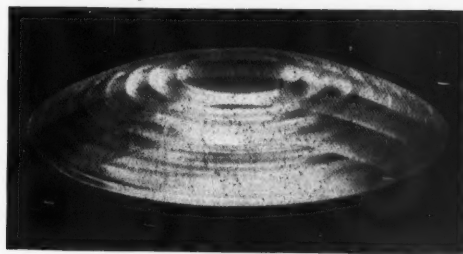
8 $\frac{3}{8}$ " dia., 9 $\frac{5}{8}$ " dia.

Inverted Toric Pattern



5 $\frac{1}{2}$ " dia., $\frac{1}{2}$ " focal length.

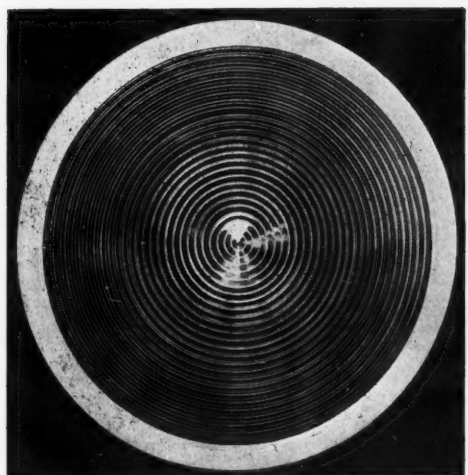
Spreadlite Pattern



5", 6 $\frac{3}{8}$ " and 8 $\frac{3}{8}$ " dia.

Traffic Control Signalling Lenses

12" x 6" f.l. Condenser Lens



8 $\frac{3}{8}$ " dia. Diffusing Roundels



Particulars of other patterns on application.

The lenses are made in **White, Red, Green, Yellow** and **Lunar-White**.

CHANCE BROTHERS & CO. LIMITED

Glassworks, SMETHWICK, Birmingham

Lighting at the Ideal Home Exhibition

We have received from the Benjamin Electric Light Ltd., the accompanying two illustrations which will serve as an interesting supplement to the article published in our last issue describing the lighting of the Ideal Home Exhibition.

The first of these shows the artificial lighting of the gardens which proved to be, as usual, an attractive feature. The sources of light are mounted high up out of the range of view and it is evident that the whole area is well illuminated. The second picture, which



FIG. 1.—A view of the Gardens at the Ideal Home Exhibition, photographed by artificial light alone.

illustrates the lighting by trough reflectors of the picture galleries in the main hall gallery, is not only an excellent night photograph but conveys a good idea of the successful lighting of these galleries. Considering the simplicity of the arrangements the results were remarkably good.



FIG. 2.—Showing the successful lighting of the Picture Galleries at the Ideal Home Exhibition, also photographed entirely by artificial light.

We understand that the great majority of the stands throughout the Exhibition were illuminated by means of standard Benjamin trough reflectors, which were also exclusively used in the gardens. Approximately 3,000 standards lengths of 2½ ft. were supplied to the official contractor, Mr. W. O. Tackley, of West Kensington.

Association of Public Lighting Engineers

PRESENTATION TO CAPTAIN LIBERTY.

We understand that the Council of the Association of Public Lighting Engineers is making a presentation to Captain Liberty, on his retirement from the Secretaryship, which he has held since the inception of the Association. The starting of a new body is always an uphill task and we have reason to know something of the work that such a task imposes on its secretary. We feel sure that everyone will be pleased to hear of this recognition of Captain Liberty's great services to the Association. Every member of the Association will naturally wish to have an opportunity of contributing, and we are accordingly asked to mention that subscriptions will be gladly received and acknowledged by the President, Mr. S. B. Langlands, Lighting Department, Tontine Buildings, 20, Trongate, Glasgow.

Floodlighting on the Great Western Railway

From time to time attention has been drawn to the growing applications of floodlighting for industrial purposes. In particular its use on various railways abroad has been recently mentioned. Through the courtesy of the Chief Engineer (G.W. Railway), we are able to present some details of floodlighting on a British railway—the imposing installation recently completed at the Old Oak Common Depot. This depot consists of carriage and waggon storage sidings and marshalling yard and is floodlighted by means of 40 500-watt floodlight projectors, 38 of which can be seen in the detailed plan reproduced in Fig. 1. These projectors are mounted on wooden poles about 35 ft. above the rail level. Staging guards and climbing irons are provided to each lighting point.



FIG. 2.—Showing the effect of the floodlighting of the Old Oak Common Depot (G.W. Railway) by night.

The installation seems to have answered requirements very well, and Fig. 2 gives a good idea of the effect of the illumination by night. The distribution of illumination appears good, and a feature is the specular reflection or "glint" off the rails. It will be noted from the photograph that the setting of the series of switches to the siding, shown in the foreground, is clearly discernable.

The exposure given in taking this photograph was five minutes and shunting operations were taking place during this period.

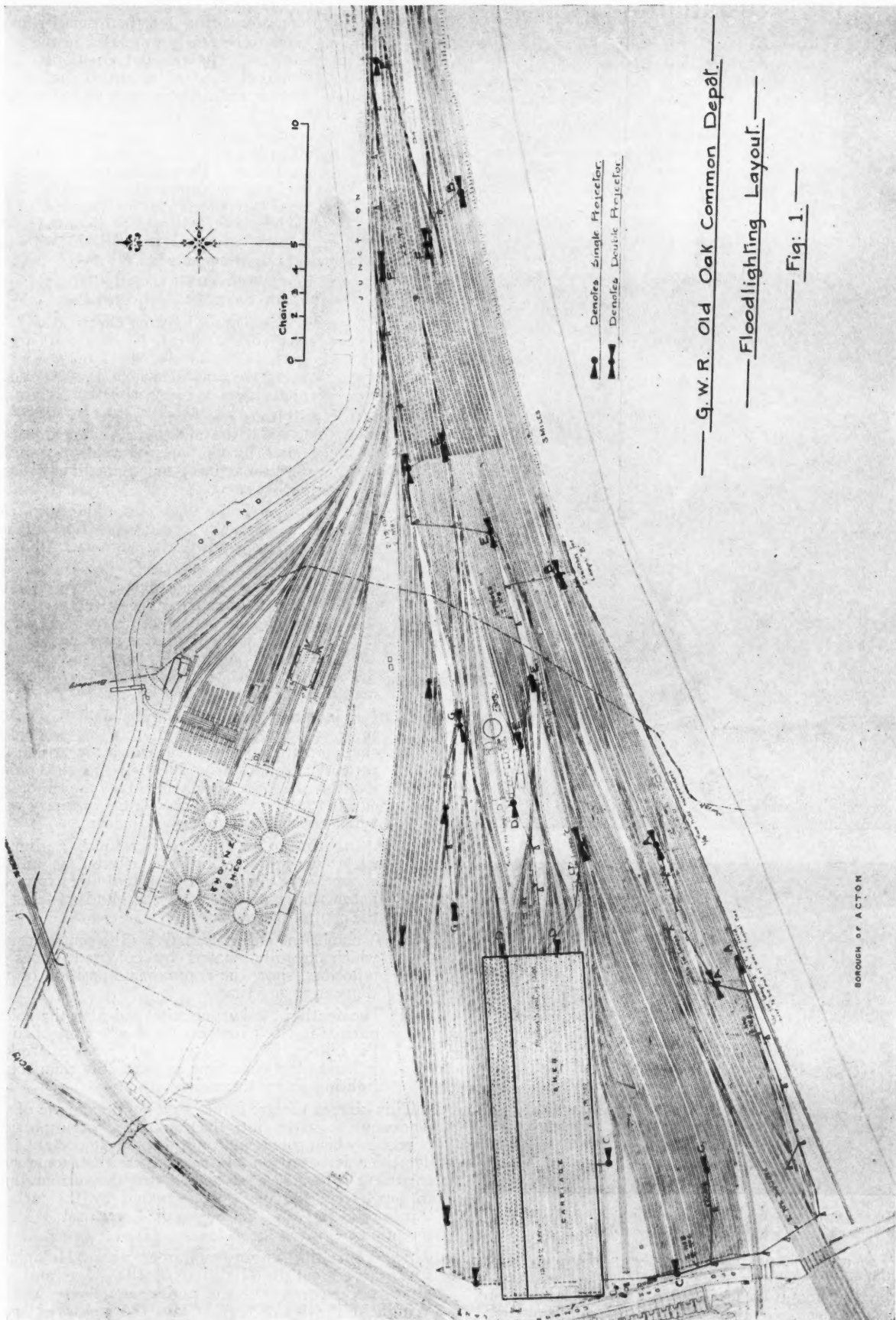
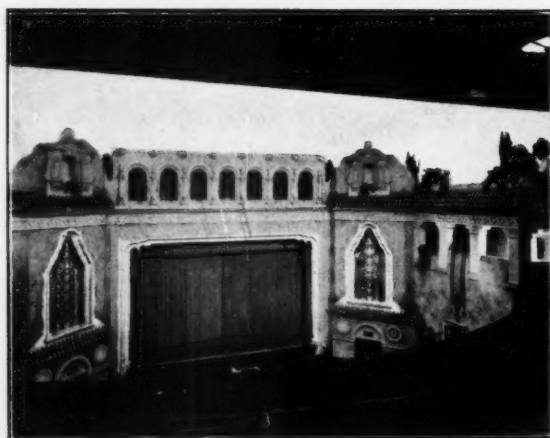
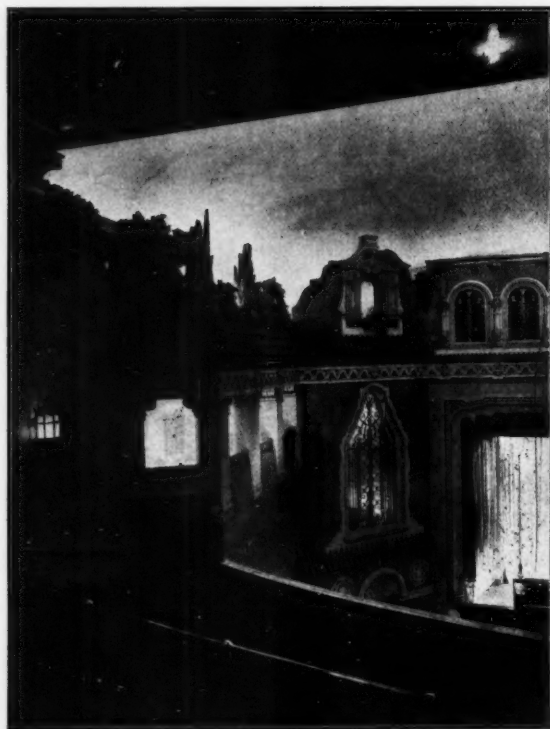


FIG. 1.—Plan showing distribution of 38 floodlighting projectors at the Old Oak Common Depot. (G.W. Railways.)

A Novel Kinema Lighting Installation

THE lighting of the new Richmond Kinema Theatre (Richmond, Surrey), illustrated below, presents a number of interesting features. The stage lighting comprises Holophane footlights and top battens with the usual range of white, red, green, and blue colours. The lighting conditions are very completely controlled by an up-to-date back of board-type stage switchboard, and contact-stud dimmers (each having over 60 contact studs) arranged in four sets of four each with individual or master control. The four colours are also controlled by a colour master switch and there are coloured pilot lamps to indicate which circuits are on.



Two views of the new Richmond Cinema. (Photographs from *The Architect and Building News*.)

The atmospheric portion of the auditorium is provided with a white plaster dome sky. This has been lighted all round by means of special Holophane three-colour reflector equipment, and the lighting is so arranged that scores of different colour lighting effects can be produced on the sky alone, ranging from a glorious sunrise to a storm setting. Every conceivable colour can be obtained, these colours changing and blending as desired.

The proscenium arch and side walls of the atmospheric portion of the auditorium are illuminated by batteries of concealed Holophane spotlights and floodlights. The spotlights are noteworthy for their small dimensions, enabling them to be neatly concealed in the front of the balcony and other convenient positions. The spotlights and floodlights are so arranged that colour lighting of any known hue can be thrown on to the walls of the auditorium.

Further Holophane colour lighting equipment has been fixed behind grilles and alcoves of the atmospheric portion of the auditorium. Here again, colour effects of every desired hue can be provided. Literally thousands of different colour effects can be obtained in the auditorium, while the footlight which illuminates the front curtains is also arranged to work in with the general colour lighting scheme.

The outstanding feature of the installation is the new Holophane automatic control, which provides:—

- (a) 672 sequences of colour lighting effects, each lasting over five minutes, can be obtained simply by setting the indicators of the sequence meter and operating the master switch (this represents one different sequence every week for 13 years).
- (b) A special lighting effect may be pre-set on a control panel while the automatic dimmer gear is working, and by the operation of the master control wheel the lighting will immediately *merge* into the pre-set effect.
- (c) If desired the house may be lighted in any desirable manner by hand operation of the switches which control the automatic dimmer gear.
- (d) Under ordinary circumstances, the operator needs simply to dial to any particular sequence and to operate the master control wheel, whereupon the lighting will gradually come up and continue to go on changing until such time as the operator wishes to take the lights down again, ready for the films.
- (e) It is intended that the lighting shall be worked in this manner so that the control equipment shall provide colour effects which are artistically perfect and properly blended in the proper manner, instead of leaving the choice of the effects to the operator, who, in the ordinary way, will also have to work the dimmers.
- (f) At no time does one actually touch a dimmer when working the lighting effects, as all the dimmers are electrically operated either from the automatic control or from the hand switches on the control panel.
- (g) A number of indicator dials on the control panel, which are illuminated by coloured lamps in reflectors, show the approximate position of *any* dimmer at any time.
- (h) The footlight colour circuits and also the colour circuits in No. 1 batten may also be controlled by the automatic control gear and may be worked either at the same time as the auditorium colour lighting or by themselves.

This kinema theatre furnishes a good example of the tendency towards introduction of "atmospheric" effects in which colour lighting plays an important role. The idea is based on the recognition that some such treatment is desirable, so as to utilize the surroundings to supplement the impression created by the picture, thus producing an "atmosphere" favourable to its reception.

The consulting engineers, under whom Holophane Ltd. carried out the lighting of the stage and the atmospheric portion of the auditorium, were Messrs. Wingfield Bowles & R. C. Clay. The electrical contractors were Messrs. Locke & Soares, and the installation was under the charge of Mr. Wallberry. Messrs. Leathart & Granger, the architects, have received well deserved congratulations on the fine appearance of the building and the atmospheric decorative scheme.

Automatic Traffic Signalling

The successful operation of control of traffic by luminous signals, discussed in Mr. Austin's recent paper before the Illuminating Engineering Society, has led to the exercise of considerable ingenuity in the design of automatic controllers. In the accompanying illustration we reproduce a general view of a typical apparatus.

Obviously automatic controllers must be capable of adjustment according to the local traffic conditions. The main variations possible are usually as follows: (a) Variation of the main period, *i.e.*, the total time cycle: (b) variation of the ratio of time allowed to each direction of traffic and (c) variation of the length of the yellow period. The item (c) is of special interest to pedestrians. In America there has been much investigation of the desirable interval between changes in traffic flow, so that pedestrians may have time to cross the streets.

Another feature of such apparatus is that alternative hand control is provided. A fully automatic system, however carefully designed, may not be suitable for all situations. There are doubtless cases where manual control of luminous signals would be preferred; or it may be desirable to use manual control during certain periods only.



A typical Automatic Traffic Controller, also incorporating hand control.



ARTIFICIAL LIGHT AND VISION.

SIR,

I am in partial agreement with the point in "Onlooker's" letter in your April issue that glare is at present largely associated with excessive brightness. It is also associated with contrast. A source may not be glaring with a certain background but become unbearably so through a change in background only. "Glare" is also used quite broadly to cover all or nearly all the "uncomfortables" in artificial light. The colour difference between unmodified artificial light and daylight can come in here unless "Onlooker" can suggest a new word to better fit this sensation.

Referring to the unduly exciting effect that red light seems to have on advocates of artificial daylight he glosses over this considerable spectral difference as "the slight excess of the red and orange end of the spectrum" although this excess is well over 60 per cent. of the total light generated. I do not doubt that as an unmodified artificial light enthusiast "Onlooker," like many others, feels privileged to describe artificial daylight as "cold." With artificial light as the standard ideal, daylight is "cold." That is admitted. Hence, if your ideal should happen to be daylight, then the unmodified artificial light must be "hot." Past records agree at any rate that it is a "warm" light. Hot, cold and warm are here used as psychological terms. That they may also have a thermal significance can, I think, also be proved by our experience here.

The illuminating engineer has long advocated illumination intensities comparable with daylight. Tungsten lamps, however, deliver about four times the total radiation per lumen that we receive direct from the sun, so that our limit of illumination intensities under artificial light will soon be based

not on the eye, but on the bodily comfort of the receiver of this high intensity illumination. How much radiant energy will he be agreeable to intercepting and transforming into heat?

A recent experience in a show window with illumination intensities of 1,500 to 2,000 foot-candles quickly demonstrated to my satisfaction that this heat is quite real. The confectioner's window must now run on materially reduced intensities in summer, and where sprinkler heads are in show windows for fire protection the 165° F. fuse plug is frequently becoming a real hazard to the illuminating engineer. One of our public utility sales rooms was stopped up several months ago to a high level of general illumination. Five large steam radiators were previously required for heating this room; during the past winter but one radiator was used.

And our heating engineers are now asking the electrical engineer, "How much light do you expect to provide in this room?" as a reduced steam heat radiation schedule has been worked out where high intensity lighting is to be provided. We are rapidly approaching the point where this heat question will largely govern the illumination intensities to be used. So that whether or not artificial light "looks hot" may soon be recognized in England as it is here that high intensity illumination has also an appreciable effect on bodily comfort. Artificial daylight is now receiving recognition as a "cold light." We are also becoming interested in infra-red absorbing filters and radiation meters to check the results. Light and heat, so long a talking point against gas-lighting, must now be shared by the electric industry. It will be of interest to gas men to note how this will be handled.

Very truly yours,

NORMAN MACBETH.

TRADE NOTES & ANNOUNCEMENTS

NOVEL LIGHTING FITTINGS.

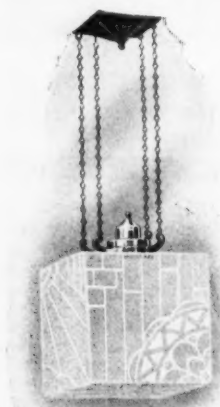
We append two illustrations of novel lighting fittings which we have received from Messrs. Hailwood & Ackroyd Ltd. Both have been only recently put upon the market and have been designed and manufactured throughout at the company's works at Morley (Leeds).



DB 4

FIG. 1.

The type shown in Fig. 1 is a bowl fitting, 16 ins. square, made up of handsomely sandblasted glass panels, supported in an ornamental metal frame and suspended from a fluted circular ceiling plate 6 ins. in diameter. The metal parts of this fitting are finished in antique brass, bronze, or oxidized, to meet the wishes of the customer.



DGI

FIG. 2.

The other fitting (Fig. 2) comprises a 9-in. glass cube, handsomely sand-blasted with a design in the modern style, suspended from an ornamental square ceiling plate. The metal-work can be obtained in antique brass, bronze, or oxidized finish. A smaller unit comprising a 6-in. cube also on the market.

Two features of interest may be noted, the use of rectangular or cubical design for the luminous portion of the fitting and the use of diffusing glass to screen the source of light from view. The adoption of four vertical chains in each case is in line with the rectangular type of glassware. Both designs have the merit of simplicity.

G.E.C. ABERDEEN CHANGE OF ADDRESS

The General Electric Co., Ltd., inform us that the branch address at Aberdeen has been changed from 30, Adelphi, to Mangnet House, 32, Market Street. The telephone No. Central 2770/1 and telegraphic address "Electricity" Aberdeen, however, remain unchanged.

G.E.C. FAR EAST CHANGES.

The General Electric Co., Ltd., also announces that owing to ill-health Mr. P. Howard has resigned his position as general manager of their Singapore Branch and that Mr. R. C. Giggins, of their Kuala Lumpur Branch, has been appointed to fill the vacancy.

TRAFFIC CONTROL SIGNALS.

MESSRS. CHANCE BROTHERS AND CO. REPORT FURTHER PROGRESS.

Readers are doubtless aware that this well-known and old-established firm has been manufacturing pressed lenses for signal purposes for some years, and the quality of their products is at least equal to that of the lenses made by foreign firms who have been manufacturers of this type of article for a longer period. It will be remembered that a traffic control signal using 12-inch lenses, a size exclusively made by this firm, was exhibited at the opening meeting of the Illuminating Engineering Society in October last (this journal, November, 1929, p. 292). We have recently seen a pamphlet produced in the research department of Messrs. Chance Brothers, giving the results of measurements of the beam candle-power from 8½-inch lenses and 12-inch lenses using the same light source. It appears from these figures that the 12-inch diameter lens—which, by the way, is being exclusively used by the Birmingham Corporation for the traffic signals which are being put up at many important cross roads in the city—gives a maximum beam intensity at least 40 per cent. greater than that given by the more usual 8½-inch roundel and an illuminated area approximately twice as great. We also understand that in view of the numerous enquiries for the signal apparatus utilizing these larger lenses Messrs. Chance Brothers have decided to commence manufacture of the complete apparatus, including the necessary control gear, in the workshop of their Lighthouse Department, at Smethwick. They are paying particular attention to the question of control gear for the progressive system. They consider that their experience in the manufacture of apparatus for lighthouses and aerial beacons will enable them to produce a more durable and efficient article than is usually designed for road traffic purposes.

CRYSELCO LTD.

NEW PREMISES IN LEEDS.

We are informed by Messrs. Cryselco Ltd. that they have found it necessary to remove from their existing premises at 11, New Station Street, Leeds, by reason of expansion of business. The new address from May 1st has been 43, York Place, Leeds (Tel. No. 27866 Leeds; telegrams, Cryselco, Leeds).

THE PHILIPS MERCHANDISER

An ingenious device, the Philips Merchandiser or "Silent Salesman," which serves as a means of increasing lamp turnover, is illustrated in a leaflet sent us by Messrs. Philips Lamps Ltd. The apparatus consists essentially of sloping rack on which lamps are mounted, with a panel behind bearing the motto "Don't Forget Lamps." The height is approximately 5 ft. and the depth and width 2 ft. It can be taken to pieces and reassembled in a few minutes, and when dismantled it can be packed in a comparatively small space. The Merchandiser is painted blue and the wording is in yellow. The white panel "Don't Forget Lamps" can be lighted up from behind, while brackets are fitted on either side, so that the lamps can be put on circuit to show customers how they appear on actual conditions. It is easy to demonstrate the different lamps by making use of these two bracket fittings. Under the lid on which the lamps are displayed, there is room available for storing other lamps, and a tray is provided underneath for displaying lamps in cartons.

CONTRACTS CLOSED.

The following contracts are announced:—

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD:—

London County Council; for all types of electric lamps.

It is interesting to note that this contract, which has been held by Messrs. Siemens Electric Lamps and Supplies Ltd. for a number of years, now covers the supply of electric lamps to those institutions formerly controlled by the Metropolitan Asylums Board and the various Boards of Guardians in the London area.



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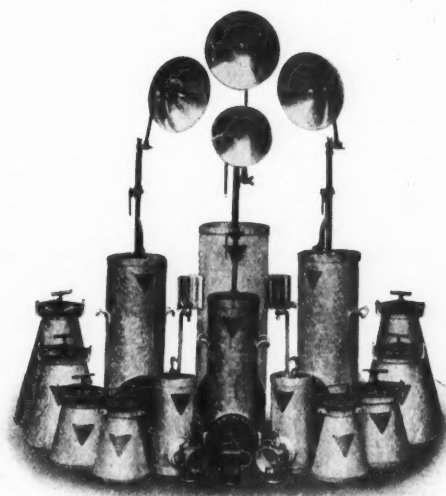
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Steatite and Porcelain Products Ltd.

VISIT TO THE WORKS AT STOURPORT.

An interesting event on May 15th was the visit arranged for members of the press to inspect the recently completed factory, laboratory and housing estate of Steatite and Porcelain Products Ltd., at Stourport, Worcs.

Visitors were received by Dr. G. C. Clayton (Imperial Chemical Industries Ltd.) in the absence of Lord Melchett, and by Mr. L. Thurner and others associated with the company. After luncheon there was an instructive tour of the works, which was followed by tea at 4.30 p.m., visitors arriving once more in Paddington by 8 p.m.

The Company is undertaking what is essentially a new industry—the manufacture of high and low tension insulating gear for the equipment of electrical development schemes. This is a field in which this country has lagged behind in the past. Very careful testing of products is necessary and the Research Laboratory is claimed to be one of the finest in the British Empire. The factory is equipped on model lines, and about 1,200 people are being employed, a considerable percentage of families from the distressed areas being included.

The factory itself is a quarter of a mile long, and a new railway station (Burlish Halt) has been built to accommodate workers, a housing estate of 300 houses has been planned and 142 of these are already built and occupied.

The official opening of this new factory on May 15th was a most interesting event, and one hopes that this enterprising new effort will flourish as it deserves.

INDEX (June, 1930).

EDITORIAL NOTES :—

Traffic Control Signals—The Essentials of Salesmanship—Public Lighting Tests at Lewisham ... 137

NOTES AND NEWS ON ILLUMINATION ... 139

NEWS FROM ABROAD ... 140

TECHNICAL SECTION :—

Transactions of the Illuminating Engineering Society
(Founded in London, 1909) :

Account of Meeting on May 6th ... 141

Traffic Control Signals, by T. Austin ... 142

POPULAR AND TRADE SECTION :—

The Floodlighting of the New "Underground" Building ... 149

Industrial Floodlighting ... 150

The use of Acetylene Lighting in Tunnels ... 152

Lighting at the Ideal Home Exhibition ... 154

Floodlighting on the G.W. Railway ... 154

A Novel Kinema Lighting Installation ... 156

CORRESPONDENCE ... 157

TRADE NOTES AND ANNOUNCEMENTS ... 158

The Illuminating Engineer

The Journal of GOOD LIGHTING

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SPECIAL INFORMATION.

THE ILLUMINATING ENGINEER (the Journal of GOOD LIGHTING) was founded in January, 1908, and has thus been in existence for twenty-two years.

SINCE the year 1909, when the Illuminating Engineering Society was founded in London, it has been the official organ of the Society.

It is the only journal in this country exclusively devoted to Lighting by all Illuminants.

It receives the assistance of contributors who are leading experts on illumination in this country and abroad. Foreign Notes and News will be a speciality, and correspondents have been appointed in all the chief cities of the world.

THE Journal contains first-hand and authoritative information on all aspects of lighting; it has also been improved and extended by the inclusion of a *Popular and Trade Section* containing special articles of interest to contractors, gas and electric supply companies, Government Departments and members of the Public.

DISCUSSIONS before the Illuminating Engineering Society which are reproduced in this Journal are participated in alike by experts on illumination and users of light, whose co-operation is specially invited.

Good Lighting is of interest to everyone. The Journal is read by engineers, architects, medical men, factory inspectors, managers of factories, educational authorities, public lighting authorities, and large users of light of all kinds.

BESIDES being issued to all members of the Illuminating Engineering Society, the Journal has an independent circulation amongst people interested in lighting in all parts of the world. The new and extended form of the Journal should result in a continual and rapid increase in circulation.

Every reader of THE ILLUMINATING ENGINEER, the Journal of GOOD LIGHTING, is interested in illumination, and is a possible purchaser of lamps and lighting appliances. Gas and Electricity Supply Undertakings likewise benefit by the movement for Better Lighting, with which the Journal is associated, and which stimulates the demand for all illuminants.

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The Centre for Information on Illumination.

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